TEEVENS' HOSPITAL
Surgical
LIBRARY.

STEEVENS' HOSPITAL

SURGICAL LIBRARY.

REGULATIONS.

1st. Each Subscriber to this library shall be entitled to receive one book at a time, which (if a Quarto,) shall be returned on, or before, the expiration of a Month, from the day on which it was given out, (if an Octavo,) in a fortnight, under a penalty of five pence per diem, for each day it may be retained exceeding that period.

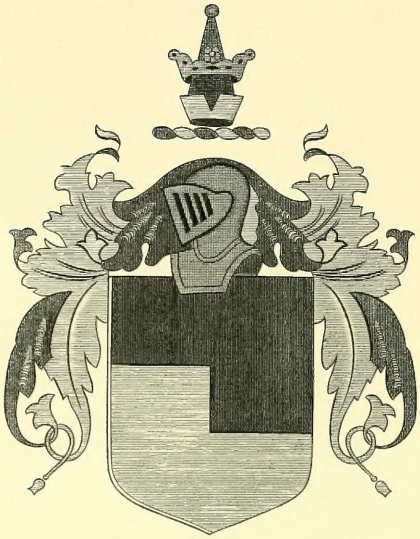
2d. If any book be written in, or otherwise injured, the price of the book shall be forfeited by the Gentleman to whom it was lent, and if it be a scarce book, or a volume of a set of books, it shall be double the price of said book.

3d. Any Gentleman using a book belonging to the library in a dissecting room, shall be subject to a penalty of five shillings and five pence, which will be rigidly enforced.

4th. Any Gentleman who has incurred a penalty, or is otherwise indebted to the library, shall not be allowed to receive a book until such debt is discharged.

The days appointed in each week for giving out and receiving books are—Tuesday, Wednesday, Thursday, Saturday, and Sunday after visiting hour in the hospital.

EX
LIBRIS
J·J·LONGACRE
·M·D···P·H·D·
H. FISCHER



Longacre

STEEVEN'S
MED. & SURGICAL LIBRARY 1813
HOSPITAL

OPERATIVE SURGERY,

&c.

VOLUME I.

Digitized by the Internet Archive
in 2011 with funding from
Open Knowledge Commons and Harvard Medical School

http://www.archive.org/details/systemofoperativ01bell

STEEVENS'
MED. & SURGICAL LIBRARY
1813
HOSPITAL

A

SYSTEM

OF

OPERATIVE SURGERY,

FOUNDED ON

THE BASIS OF ANATOMY.

VOLUME I.

BY CHARLES BELL.

London:

PRINTED FOR LONGMAN, HURST, REES, AND ORME, PATER-NOSTER ROW;
AND CADELL AND DAVIES, STRAND.

1807.

C. STOWER, Printer,
Pater-noster Row.

TO

WILLIAM LYNN, ESQ.

SENIOR SURGEON OF THE WESTMINSTER HOSPITAL,

&c. &c. &c.

MY DEAR SIR,

It is particularly gratifying to me to have an opportunity of expressing to you publicly my sense of the warmth of your friendship, and my respect for your professional talents.

Your benevolence, and the skill which you displayed in the exercise of your profession, first drew me towards you, and made me desirous of your friendship; and it was with great pleasure that I saw you, by your late appointment, enabled to make that skill and experience more extensively useful, by teaching the Medical Cadets of the Army simplicity

lidity and precision in their operations, and the high importance of a knowledge of Anatomy to the fulfilment of their duties.

I remain,

MY DEAR SIR,

Your most faithful

And sincere Friend,

CHARLES BELL.

PREFACE.

At no time has a critical inquiry into the practice of surgery been more necessary than at present. But a critical inquiry is too apt to lead to speculation, and long and laborious disquisition, till in the end the young surgeon finds himself encumbered with a library, instead of a manual of operative surgery; and the extent and expense of the work defeats in a great degree the author's design. A calm and disinterested view of the surgery of the present day, clearly set forth, and deduced from actual observation, grounded on correct knowledge of anatomy, will, I conceive, lead to more good than the most alluring work, in which novelty and ingenious speculation should be the avowed objects of the author.

The

The intention in these volumes is to present to the student, and to the surgeon, such clear, short, and strong views of the objects of our operation; of the manner of operating; and of the difficulties which may unexpectedly present themselves—as an experienced surgeon would wish to impress on the mind of one in whom he is much interested:—such a view, in short, of operative surgery, as, without putting aside the information gained in general study, may guard against the distraction of difficulties and doubts, when the knife is actually in the hand.

Let it not be supposed that the author either professes or flatters himself that he has effectually accomplished this design. He means only to declare what is his peculiar plan—what were the motives of his writing this book, and his hopes of doing good. That a design so obviously useful has not already been executed, is surprising—and indeed so much is a work of the kind required, that this alone would serve in a great measure as an apology for the present attempt, however defective.

In the study of anatomy and surgery, strong motives are required to investigation and experiment. Our

Our inquiries must still be rendered interesting, and our industry excited, by ingenious theory and speculative views. Without these, our efforts will be languid, and our pursuit of science futile and without energy. But the author of this work must disclaim all these more pleasing methods of investigating his subjects, and keep steadily in his mind the object he has already professed. Having to deliver a simple and concise system of rules for the actual practice of surgery, he must keep close to the text, and can never venture to indulge in disquisition but on points the most essential. His wish is, that he may be said to have taken a simple and correct, not an ingenious view of the practice of surgery.

This work I profess to be original. In writing it, I have not collected my library around me, and consulted books chiefly. But though original in one sense, the student may discover in it no novelties, nor the intelligent surgeon, who holds communication with his fellows of the profession, find any rules or observations with which he is not familiar.

But I have enjoyed benefits of which I may fairly boast, as promising something useful in such a work. I have

I have been educated to anatomy with a strictness and severity for which I am now grateful. United in study with a brother whom the general sense of the profession ranks very high, long his assistant, and then his partner—I was still dissatisfied, until I had a wider knowledge of the profession; and finding myself suddenly deprived of the opportunities I had enjoyed as a surgeon of the hospital of Edinburgh, I removed to a larger field, which has been attended with this consolation, that I have been enabled to cultivate a wider acquaintance with the profession, and to enjoy the conversation of men eminent in the pursuit and practice of it. These opportunities I have diligently improved, courting the intimacy of those surgeons from whom I could derive professional information, uncontaminated by prejudice or self-interestedness, but accompanied with the liberality and candour which makes science more pleasing.

These are opportunities of information and improvement of which I may be allowed to boast. From sources like these, I have endeavoured to draw the simplest and clearest view of the approved practice; and as concisely as possible I have described the manner of operating.

One

One thing further I think it right once for all to state, that I have described no operation which I have not performed; from bleeding in the arm to lithotomy with the knife alone; from tying the umbilical cord to the operation of Cæsarean section. This I say not from any impulse of vanity, but from a wish to explain to my reader what may perhaps the better entitle me to speak as I have done. Before we have taken the knife in our hand, and are preparing to perform an operation, we do not precisely know which is the important point—our ideas are vague—the circumstances which ought most to engage the surgeon's attention, are not distinctly before us—the difficulties which disturb him the most, are not fully seen and appreciated. It is by reflecting on the doubts which arise during operations, and by taking advantage of the recollections which crowd into the mind after it is over, and thus considering the subject entirely in a practical light, that I have been able to compress this systematical view of surgery into these narrow bounds.

I proceed upon the supposition that general doctrines, and a knowledge of anatomy, have been impressed upon the mind while a pupil; but that when great occasions call for sudden exertion, the young

young surgeon may with infinite benefit turn to a detail of what is necessary to be done, unembarrassed by disquisition. I have endeavoured to present to my reader the train of reasoning which passes through the mind of the operator, and to give such ideas of the probable occurrences as I have known the best operators put into short notes previous to operation. To the general rule, indeed, I know of no exception; namely, that all surgeons require, on the eve of an important operation, to have the judgment brought to bear maturely on the case, and the matter systematically arranged, so that by an anticipation of all probable occurrences, he may avoid the possibility of embarrassment, and the distraction of consultations and whisperings during the operation.

I have unavoidably been led to express my own sense of what is right in operation, and sometimes have considered myself as bound to give my own view of the subject, in preference to that generally taken. But I trust that I shall not be found to have sought occasion thus to speak of myself, or to blame the established and received method. If I shall have succeeded in making this book truly useful, I shall be too happy in the benefit

nefit that may arise from it to the profession, to give myself one moment's concern whether I have lost or gained in reputation for originality.

In this book, as well as in the Anatomy, I have opposed my opinion to men of much eminence, and sometimes to my most particular friends. If any of my readers continue to think this arises from an unworthy spirit of enmity or opposition, I trust that those who are more familiar with my opinions, as delivered in my lectures, or in privately discussing a contested point, will in time entirely counteract the tendency of such thoughts. They see no distinction in the statement of my opinions, whether opposed to a justly-valued brother, or to those whom they may conceive to be in an opposite interest to me.

To my epitome of Surgery, I have added rules in the practice and operations of Midwifery. This has been usual in systems of surgery; and from my early attention to this department, I have been enabled, I trust, to give simplicity to the directions laid down. But there is much of principle running through the whole of the practice of midwifery; and into this wide field I do not enter at present.

It

It might seem vain were I to say how much, in my opinion, still remains to be done in settling the principles of midwifery on the foundation of anatomy and pathology.

I shall conclude with saying, that if I shall have appeared to omit any thing essential, it is because I have had no opportunity of considering the subject practically. It is better to make this avowal at once, than from books to gather at second hand; and make a show in titles of what is not honestly contained in the book.

In treating of hernia, I have of necessity, and yet not unwillingly, spoken of Mr. Cooper's work, in terms of criticism, while yet I am ashamed to observe, that I have neglected to notice its greatest merit, in the precision he has given to the operation, and his incontestibly proving the necessity of cutting the stricture in one precise manner. Before the publication of his book, surgeons differed in their practice; some cutting the tendon of the external oblique muscle upwards and outwards, while others cut it upwards and inwards.

Had I known Mr. Abernethy's opinions on the

subject of fungus cerebri, I should have been able to give a simpler and more correct arrangement and description of the tumours which arise from the fracture of the cranium.

The tying of the iliac artery, in case of inguinal aneurism, was performed lately, by Mr. George Freer, in the Birmingham hospital, with complete success. Mr. Freer means to publish this case, with some general observations upon aneurism.

CONTENTS

OF

VOLUME I.

OF WOUNDS.

Contusion	Page 1
Of a Cut	6
Of a Penetrating Wound	7
Puncture	9
Lacerated Wound	11
Of Inflammation, as it regards the foregoing Distinctions in Wounds	12
Approach of Mortification	19
Of Carbuncle	24
Of Abscess	25
Sinus and Fistula	30
Character of Gun-shot Wounds	31
Of a Wound by a Bullet	ib.
Of the Course of a Bullet	33
Of Inflammation from Gun-shot Wounds	34
Short Notices regarding the Stopping of Hæmorrhagies	41
Of the Needle and Tenaculum	51
Of the Use of the Needle in Flesh Wounds	56

CHAPTER I.

	Page
Of Bleeding in the Vein of the Arm	60
Bad Consequences which may follow Bleeding in the Arm	64
Inflammation of the Arm under the Fascia	65
Of Inflammation of the Vein	66
Inflammation of the Absorbents	67
Of the Injury of the Nerve	68

CHAPTER II.

Of Aneurism	70
Of the Wound of the Artery, in bleeding in the Arm, and of the Operation for Aneurism	72
Operation	74
The Operation for POPLITEAL ANEURISM	77
Place of the Incision	78
Consequences of the Operation	81
Of Tying the External Iliac Artery, in the FEMORAL ANEURISM	83
Of ANEURISMAL VARIX	86
Of Tying the Varicose Veins of the Leg and Thigh	89
Operation	91
Of Varicose Enlargement of the Veins of the Spermatic Cord	94

CHAPTER III.

Of Stricture in the Urethra	97
Of Sounding the Urethra, to ascertain the Place and Extent of the Stricture	100
Of the Bougie as a Cure for Stricture	105
Of the Caustic	108

Page

Of the Application of the Caustic in a liquid form, to the long Contractions and Callosities of the Urethra . 112
Operation 115
Fistula in the Perineum . . . 118
Of cutting out Part of the Urethra . . 123
Of forming a new Urethra, when Part of the Canal has been destroyed by Ulcer . . . 124

CHAPTER IV.

Operations on the Penis . . . 128
Amputation of the Penis . . . 130
Operation 131

CHAPTER V.

OPERATIONS ON THE ANUS AND RECTUM.

Of Hæmorrhoids, or Tumours in the Extremity of the Gut 135
Prolapsus Ani 141
Of Fistula in Ano 143
Contraction of the Rectum . . . 154
Concretions in the Rectum . . . 156
Preternatural Anus 157

CHAPTER VI.

OPERATIONS ON THE FEMALE PARTS.

Of the Female Catheter . . . 161
Imperforated Vagina . . . 163

Page
Of the Prolapsus of the Womb, and of the Use of Pessaries 165
Of Polypus in the Vagina . . . 168

CHAPTER VII.

Of the Operation for Cancerous Breast . . 177
Lymphatic Glands 183
Operation 184
Of the cutting out of the Glands of the Axilla . 188

CHAPTER VIII.

Of the Hydrocele 193
Of the Cure by Injection . . . 197
Instruments . . . . ib.
Operation 198
Mr. Pott's Operation of the Seton . . 204
Of the Operation by Incision . . . 206

CHAPTER IX.

Of Polypus of the Nose . . . 208
Of Tying the Polypi . . . 214
Polypus of the Ear . . . 220

CHAPTER X.

Of the Extirpation of the Testicle . . 222

OF HERNIA.

CHAPTER I.

	Page
Introductory View of the Subject of Hernia	234
Definition	ib.
Varieties of Hernia	236
Of Hernia with Tumour	ib.
Of concealed Hernia	237
Obstructions in the Bowels, which in their Symptoms resemble Hernia	239
Symptoms of Mechanical Obstruction in the Intestinal Canal, and of the Iliac Passion	240
Symptoms in Hernia	241
Of the Cause of Death	242
Of the Cause of Strangulation, and the Question of Spasm in the Sac or Stricture	245

CHAPTER II.

Of the Sac of a Hernia more particularly, and of the Part which forms the Stricture in the Strangulated Hernia	249
Neck of the Sac	251
Of the difference between Incarceration and Strangulation	254
Character of the Herniary Tumour	255
Of Hernia descending through the Ring of the Abdominal Muscles	257
With what Diseases it may be confounded	ib.
Of the Reduction of the Inguinal Hernia by the Hand	261
Of the Truss	264
Operation for Bubonocele and Scrotal Hernia	266
Of the Direction of the Incision of the Ring, and of the propriety of cutting the Ring without the Neck of the Sac	270

Page
Of the Intestine 275
Colour of the Strangulated Intestine . . 276
Of the Omentum 278
Of the Wound after Reduction . . 281
Further Disquisition on the Sac of the Hernia . 282
A more particular Inquiry into Dr. Monro's Proposal of Operating by cutting the Tendon only . . 287

CHAPTER III.

Of Femoral Hernia 292
Operation for Femoral Hernia . . . 296
The Umbilical Hernia . . . 300

CHAPTER IV.

Of the Catheter 302
Introduction of the Catheter . . . 306
Of Stones in the Urethra . . . 312
Of Puncturing the Bladder . . . 314
Of Tapping the Abdomen . . . 318
Of the Water in the Chest . . . 325
Of the Paracentesis Thoracis . . . 326

CHAPTER V.

Of Lithotomy 329
Of the Symptoms of the Stone in the Bladder, and of Sounding 331
Of Sounding, and feeling the Stone . . 333
The Operation 336
Instruments, &c. . . . . ib.

Page
Position of the Patient . . . 338
First Incision 340
Cutting the Urethra . . . 343
Of the Gorget 344
Of the Forceps 346
Hæmorrhagy 354
Of the Operation as performed in the Westminster Hospital 357
Operation of Lithotomy with the Knife . . 360

CHAPTER VI.

Of Amputation of the Limbs . . . 364
Amputation of the Thigh . . . 371
Instruments and Apparatus . . ib.

CHAPTER VII.

Amputation of the Leg below the Knee . . 384
First, of the common Operation by the circular Incision, a few Inches below the Knee . . . ib.

CHAPTER VIII.

Amputation nearer the Ancle . . . 387
Of the Amputation of the Toes and Fingers . 390
Amputation above the Elbow . . . 393
Amputation of the Fore-arm, below the Elbow-joint ib.

CHAPTER IX.

	Page
Of the Amputation at the Shoulder-joint	395
General concluding Remarks	400

CHAPTER X.

Of Wounds of the Head, and of Trepan	403
Of Concussion of the Brain	406
Of Inflammation of the Brain	410
Of Compression of the Brain	411
Pathological Principle, explaining the Symptoms of Compression	414
Injuries of the Scalp, Bone, and Dura Mater	415
Injury of the Bone from a Gun-shot Wound	421
Of Exfoliation in the Cranium	422
Of Extravasation of Blood betwixt the Bone and Dura Mater	424
Of the more partial Inflammation of the Brain, with Ulcer	426
Of the Fungus Cerebri	427

CHAPTER XI.

Of the Operation of Trepan	433
Integuments	440
Pericranium	441

STEVENS'S
HOSPITAL
LIBRARY.

Fig. 1.

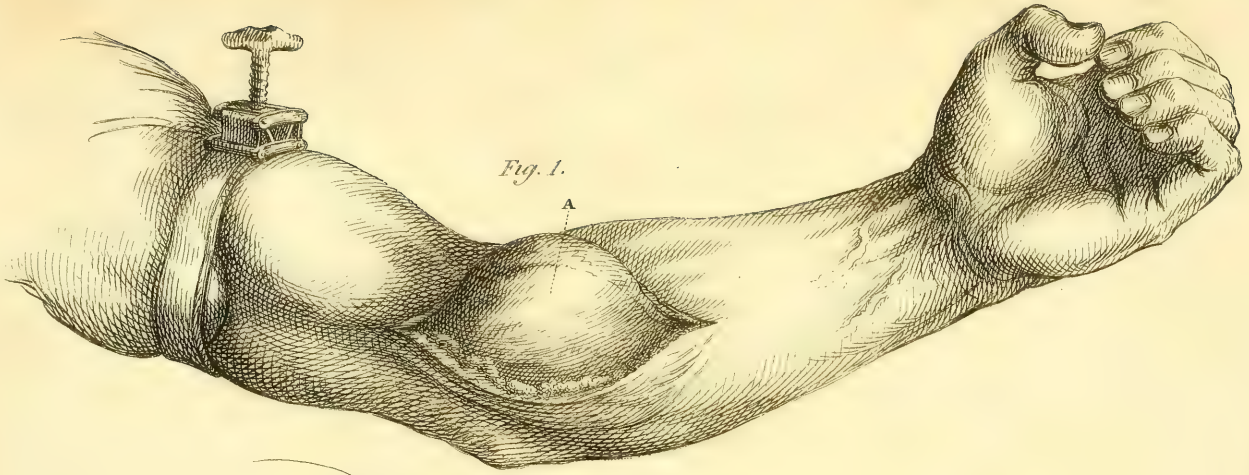
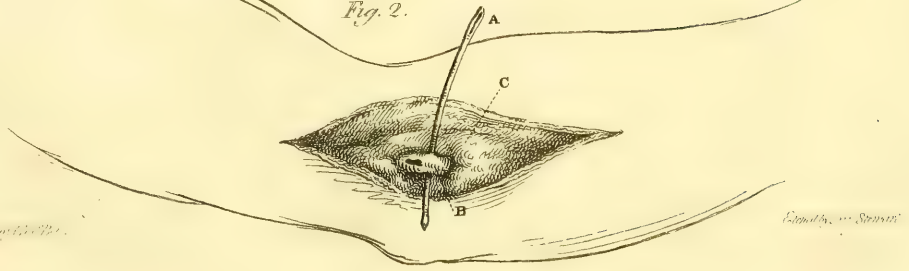
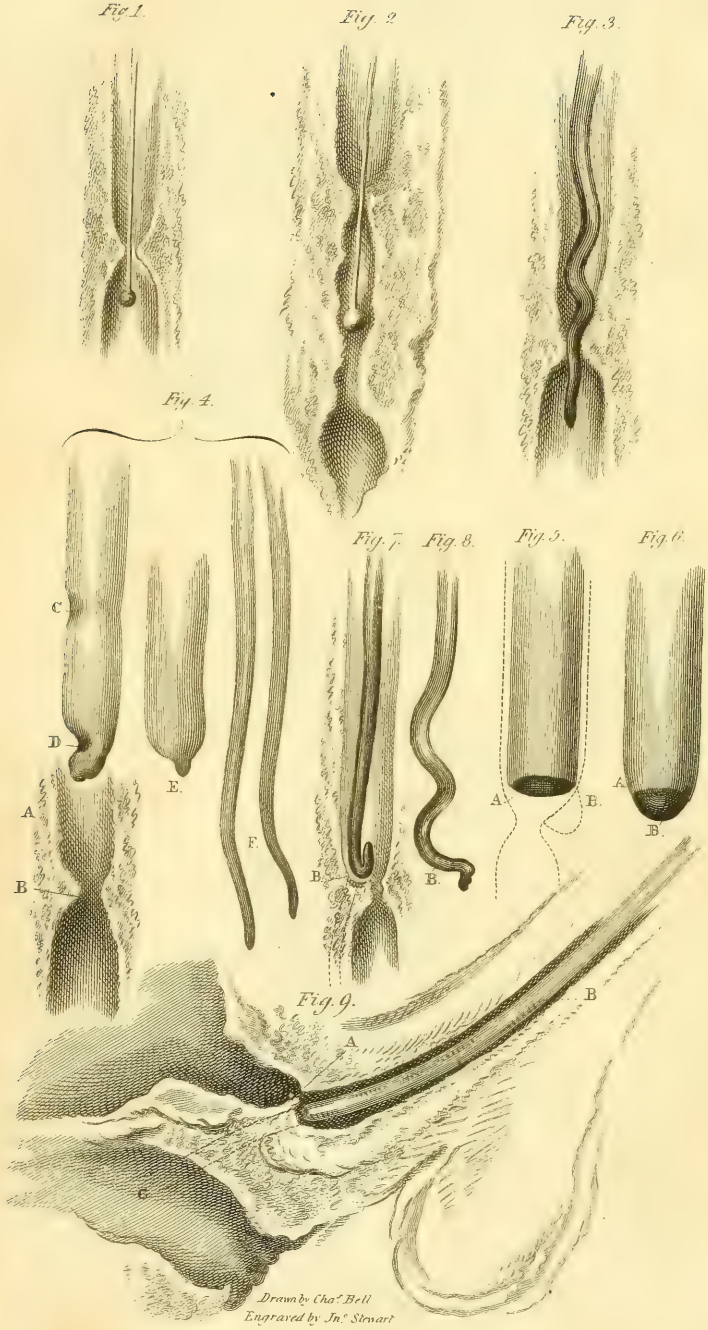


Fig. 2.



London Pub.d by Longman &C.o March 1807.

STEEVENS'S
HOSPITAL
LIBRARY.



London Pubd March 1807 by Longman & Cº

EXPLANATION

OF

THE PLATES.

PLATE I.

FIGURE 1. represents in a sketch the first incision of the operation for aneurism in the bend of the arm.

A, The sac of the aneurism, formed of the fascia and condensed cellular membrane.

The contracted state of the arm and fingers, characteristic of this aneurism, is represented.

FIG. 2. is a still freer sketch of the manner of lifting the artery on the probe, from the irregular bottom of the cavity in which it lies.

A, The probe.

B, The artery.

C, The irregular cavity, formed by the driving of the blood under the fascia.

PLATE II.

Representing the manner of examining and applying caustic to stricture of the urethra.

FIG. 1. represents a section of the urethra, as in a simple stricture, with the probe introduced. As soon as the head of the probe has passed the stricture, the wire moves easily onwards, ascertaining that it is a simple stricture.

FIG. 2. represents the probe passed into an irregular callosity of the canal; where, by the continued resistance to the head of the probe, we know that the stricture is not simple.

FIG. 3. shews the insufficiency of the bougie to ascertain any thing more than merely the presence of a stricture.

FIG. 4. A, Represents the urethra with a stricture. B, The stricture particularly prominent on one side. C, Marks the circular impression on the soft bougie, where we find, that on one side there is a greater depth of the impression, which guides us in a great measure in the application of the caustic. D, The form of the extremity of the soft bougie, which in the same way points out to us the necessity of applying the caustic, presented more to one side.

E, Represents the appearance which the soft wax bougie takes, when it is gently, but for some time, pressed down upon a small stricture, which has left an opening more to one side. There is a projecting point at E, to which we adapt the smaller bougie, F; for by making a bulging to the other side, the point of the bougie is thrown towards the opening of the stricture.

FIG. 5. I have imagined that when the urethra and stricture take the form of the dotted line, if the caustic be broad, as at A, it may burn the portion, B, without touching the stricture, and make the beginning of a new passage, like that represented in Plate IV.

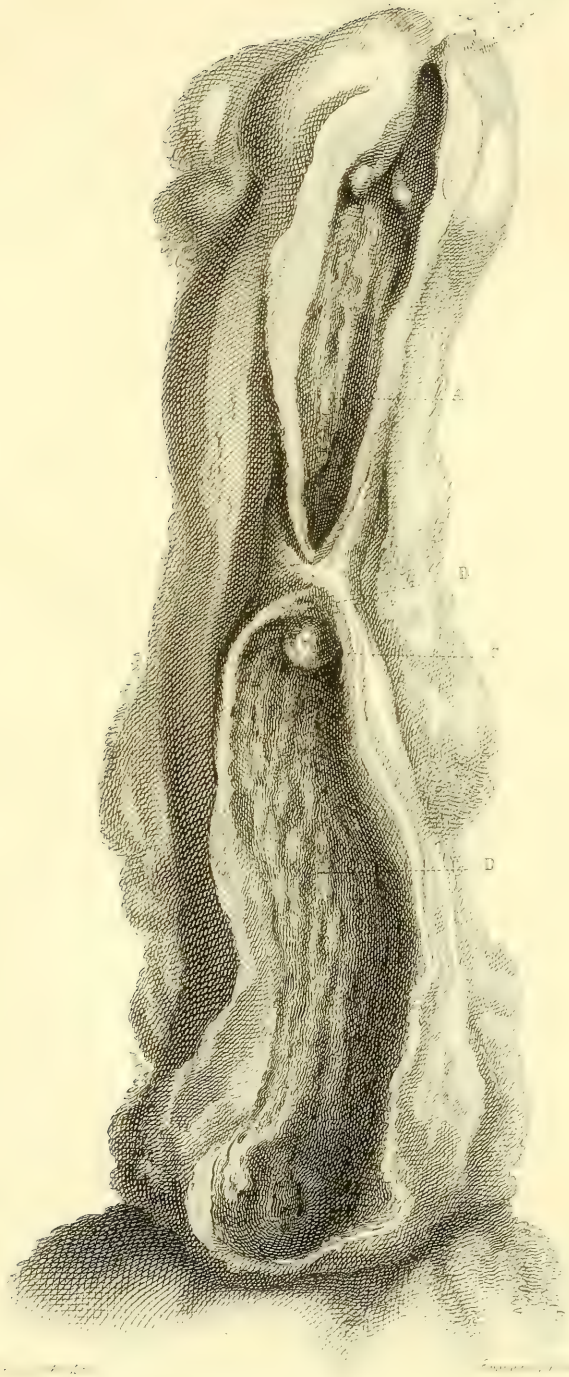
FIG. 6. For the reasons assigned above (in explanation of Fig. 5.), I have formed the bougie and caustic into this form. A, The edge of the bougie. B, The caustic, of a somewhat pyramidal shape.

FIG. 7. When the stricture is irregular, and the opening through the stricture not in the middle of the passage, the bougie is apt to have its point turned back in this way.

FIG. 8. This is the figure which the bougie takes when it is small, being calculated for a narrow stricture. It sinks down like the turns

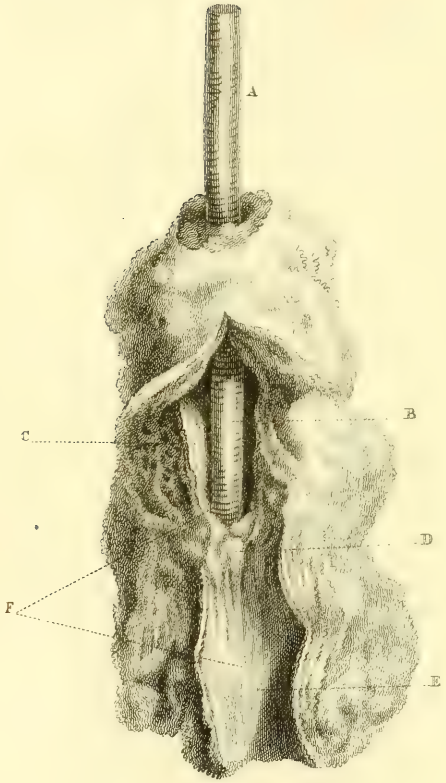
STEVENS'S
HOSPITAL
LIBRARY.

Plate XV.



London Publ.d March 1807 by Longman & C.o

STEVENS'S HOSPITAL LIBRARY.



London. Pub.d March 1807 by Longman & C.o

of a cork-screw; while the small point entering, is perhaps flattened, shewing the nature of the stricture.

Fig. 9. This figure represents the caustic bougie in the lower part of the urethra.

A, The stricture.

B, The armed bougie, with the point applied not to the stricture, but in a direction which, if persevered in, will at last open a communication with the rectum, in the direction of the dotted lines, C. This I have known to take place by the surest proof, feeling the bougie in the rectum.

PLATE III.

This plate represents a stricture in the urethra, with a small calculus behind it, which caused a fatal suppression of urine.

A, The part of the urethra above the stricture, slit up.

B, The stricture of the urethra.

C, The stone imparted into the stricture, and placed like a valve, so as entirely to stop the stream of urine.

D, The part of the urethra behind the stricture, much enlarged, and lined with a shreddy coat of coagulable lymph, thrown out by inflammation.

PLATE IV.

This plate represents the effect of continued boring with the bougie, in a wrong direction, after the use of the caustic. A false passage is made, of an inch and a half in length. It comprehends the bulb, and lower part of the urethra, cut off from the body of the penis, and a bougie put into the false passage.

A, The bougie.

B, The bougie in the urethra, above the stricture.

C, The urethra, above the stricture.

D, The irregularities of the stricture shewn, by slitting up the canal.

E, The urethra below the stricture, considerably larger than where it is above the contraction.

F, Marks the length to which the bougie had descended in a new direction, forced into the spongy body of the urethra.

PLATE V.

This plate represents the appearance of the sore, after a great part of the urethra and diseased skin of the perineum was cut out.

A, The scrotum held aside.

B B, The wound granulating.

C, A bougie passed down from the point of the penis.

D, Another bougie introduced into the bladder from the wound.

The wound is in that stage in which it shews a disposition to granulate and fill up, and when these bougies should be withdrawn, and a catheter introduced in all the length of the urethra, and into the bladder—when the granulations, B B, growing up about it, encloses it.

N. B. Skin which is diseased from fistula, and impediments to the urine, will yet regenerate, when the cause of the disease has been removed.

PLATE VI.

This sketch represents a contracted rectum, and a fistulous opening formed in consequence above the stricture.

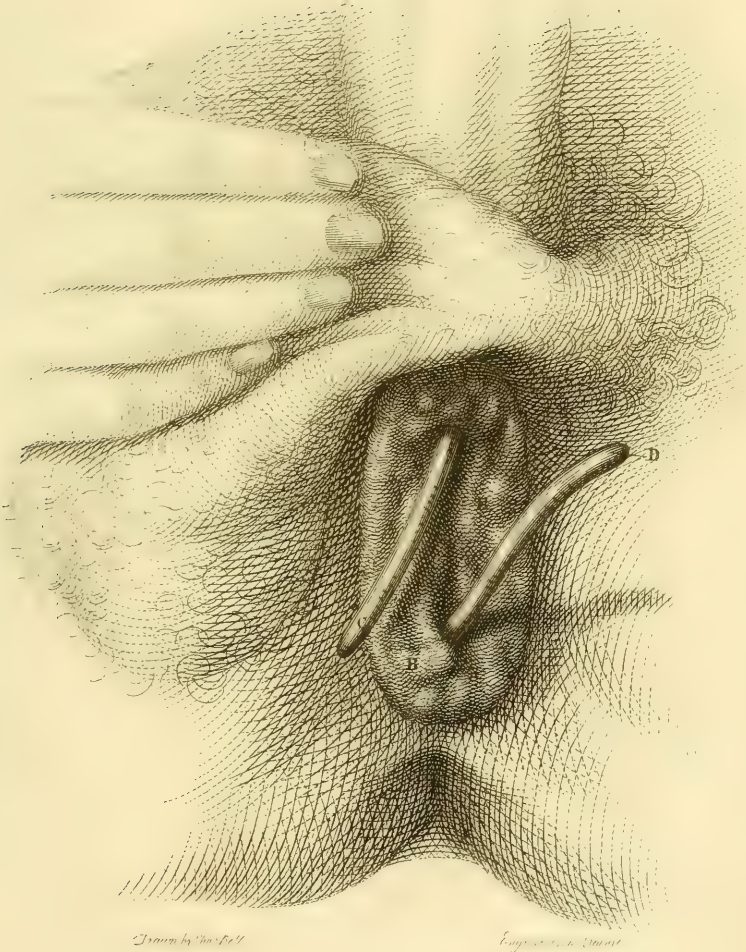
A B, The probe passed through the strictured part of the rectum.

C, The part of the rectum above the stricture, slit open.

D, An angular, ulcerated opening, from the rectum into the surrounding cellular membrane, which was followed by a fatal fistula.

STEVENS'S HOSPITAL LIBRARY.

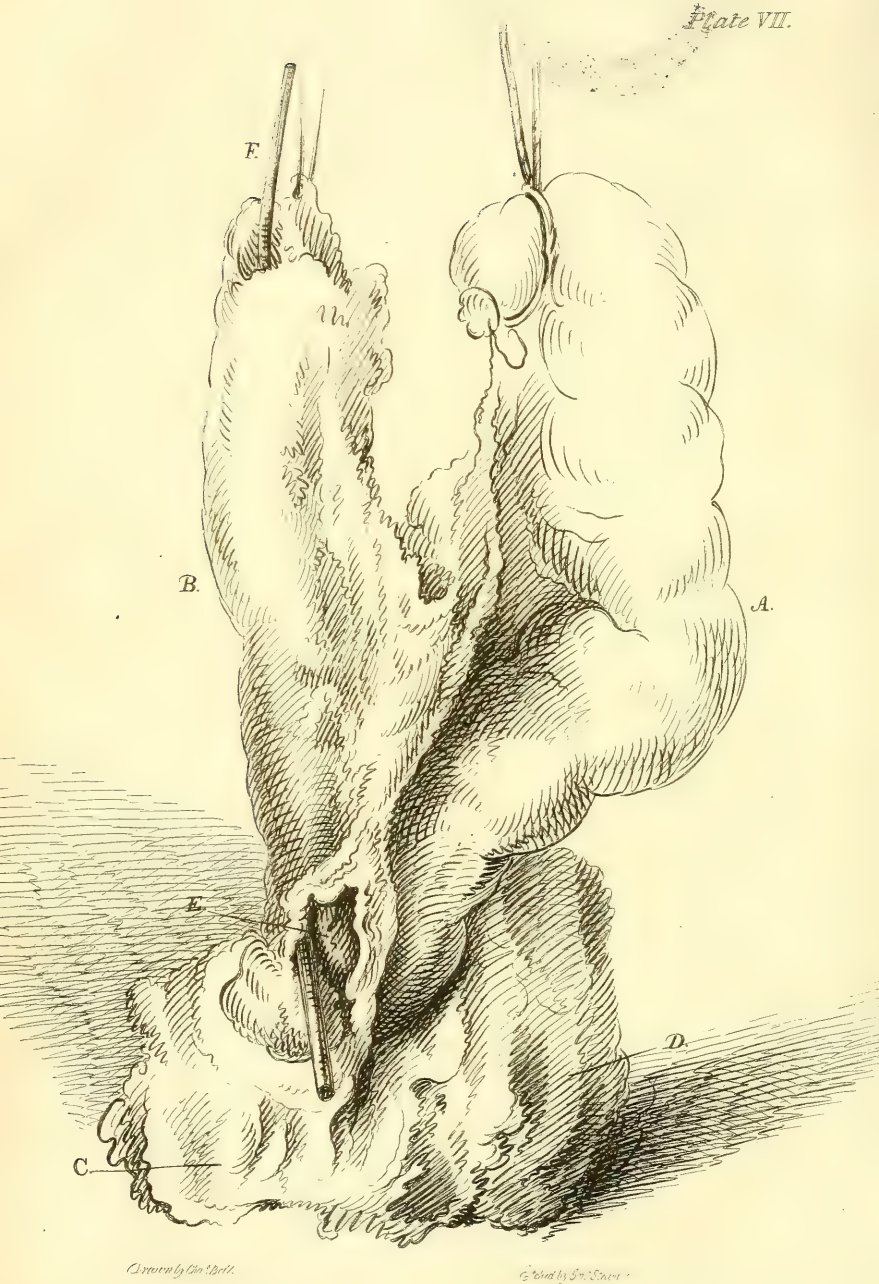
Plate V.



London Pub.d March 1.st 1807 by Longman & Co.

STEEVENS'S
HOSPITAL
LIBRARY.

Plate VII.

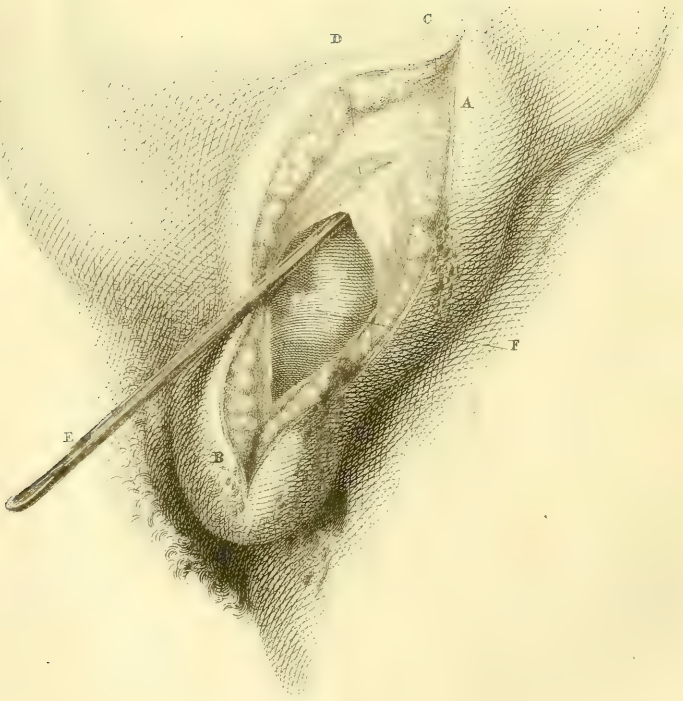


Drawn by Chs. Bell.

Etched by Jas. Stow.

London. Pub.d March 1807 by Longman & C.o

STEPNEY
HOSPITAL
LIBRARY



London Pub.d March 1807 by Longman & C.o

PLATE VII.

I give a sketch of this torn intestine, that the young surgeon may the better recollect that it is dangerous to use much force in endeavouring to reduce a hernia, especially if there be reason to suppose that the last stage of strangulation is advancing. In this instance, as is too often done, one last powerful effort was made to reduce the hernia, before the operation of the knife was resorted to. The gut was reduced; but we see the consequences.

A B, A portion of the intestine.

C D, A portion of the abdominal muscles and peritoneum, to which the intestine still adheres.

E, The part of the gut which was down in the hernia, torn by the force used in reduction.

F, A quill introduced by the gut, and coming out by the torn part of it.

PLATE VIII.

In this plate I have given a view of the operation for hernia, descending into the labium of the woman. From being an inguinal hernia, the intestine had descended to become a hernia resembling the scrotal hernia of the male, only that it is contained in the labium.

A B, The extent of the herniary tumour.

C, From this to B, is the course of the first incision, which cuts through the skin and cellular membrane, and exposes the fascia.

D, The fascia which covers the proper sac of the hernia. After dissecting off some lamina from it, it is pinched up by the forceps, and the knife being carried horizontally on the surface of the tumour, this layer is cut through: then the directory is pushed under it.

E, The directory pushed under the fascia, to ascertain its nature. Along this the knife is run, laying open the proper peritoneal sac.

F, The peritoneal sac, smooth; with distinct vessels running in it, and so transparent that the intestine gives it a darker hue.

PLATE IX.

In this plate we have a view of the second stage of the same operation.

The peritoneal sac has been cut up, and now the intestine appears.

A, A portion of the small intestine, which seems to have been the original contents of the herniary sac, and which had here suffered less by the incarceration.

B, A portion of the great intestine, which had descended more lately, and had been the cause of strangulation. It is known to be a portion of the great intestine, from the greater size, the cellular form, and the fatty appendages which hang from it.

The manner in which these portions of the intestines rise and cover the ring, may give the surgeon an idea of the difficulty which sometimes occurs in cutting the stricture.

PLATE X.

FIG. 1. This is a sketch demonstrating that the epigastric artery may be cut, and shewing how it is cut. It represents the tendon of the external oblique muscle dissected, after operation.

A, The direction in which the tendon was first cut, to enlarge the stricture, viz. upward and inward.

B, The direction in which a second cut was made, the first having, as it was imagined, been insufficient. This is inward and upward; and in this incision the epigastric artery was cut.

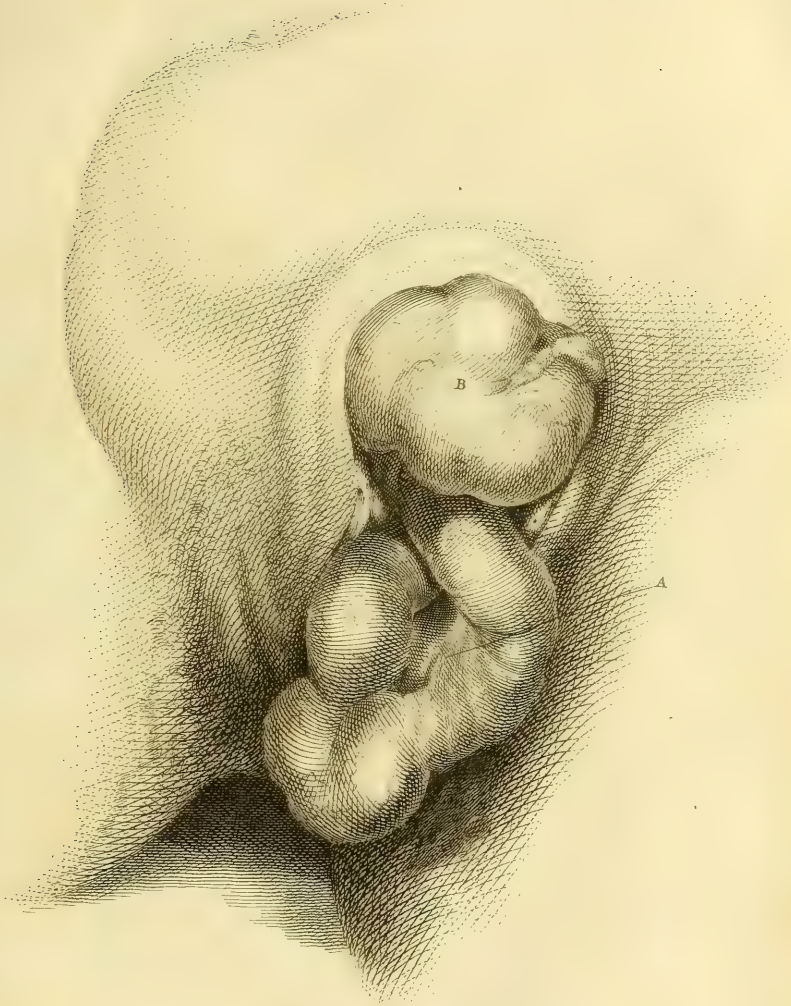
C, The epigastric artery cut across.

FIG. 2. This represents the neck of the sac of a small hernia, to demonstrate that, independent of the tendons, the peritoneum will sometimes acquire a firmness and tendinous nature sufficient to strangulate.

A, Marks the stringy appearance of the peritoneum, around the mouth of the sac.

B, The mouth of the sac.

C, A portion of the abdominal muscles, cut out with the sac.



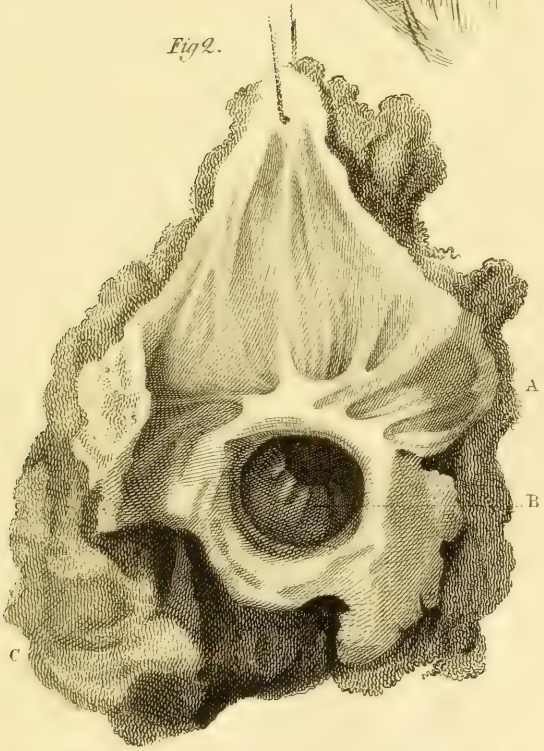
London Pub.d March 1807 by Longman & C.o

ST. THOMAS'S
HOSPITAL
LIBRARY.

Plate X.

Fig 1.

Fig 2.

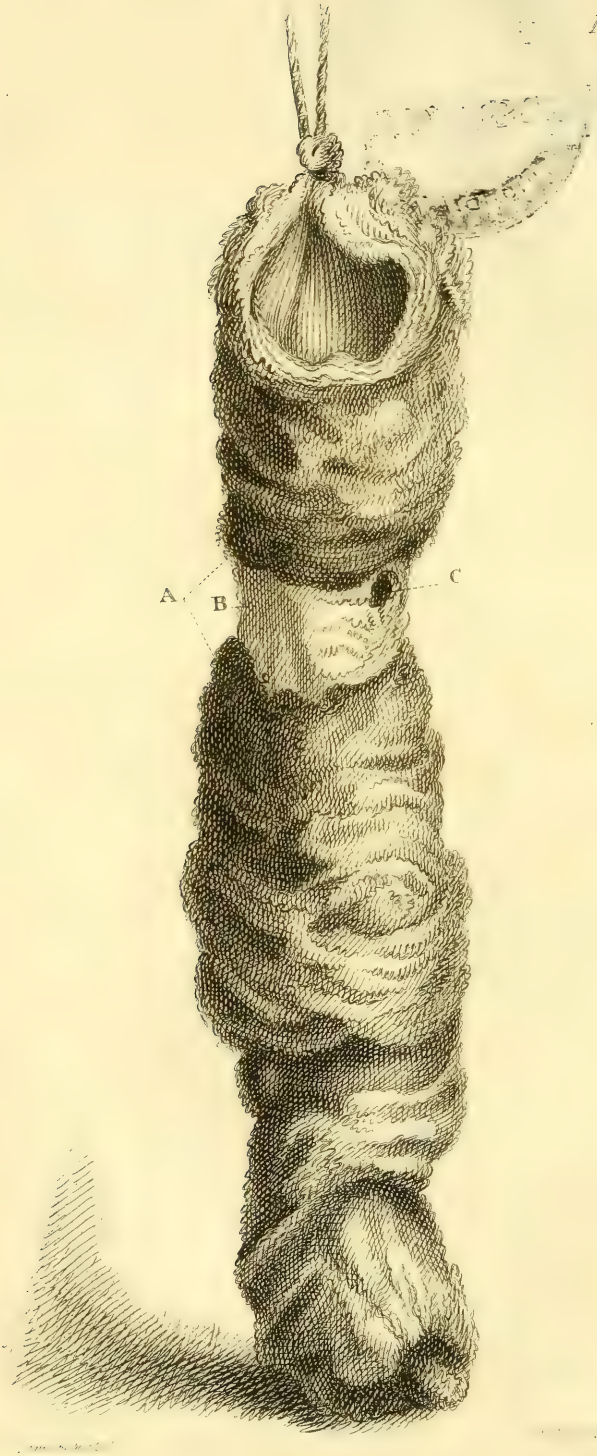


Engraved by Jas. Stuart.

London Pub.d March 1807 by Longman & C.o

HOSPITAL

STEEVENS'S
HOSPITAL
LIBRARY.



London Pub.d March 1807 by Longman & C.o

ST THOMAS'S
HOSPITAL
LIBRARY.

London. Pub.d March 1807 by Longman & C.o

PLATE XI.

This I conceive to be a curious instance of the effect of violence done to the intestine, in pushing it through the stricture, after the sac was laid open. The intestine is here inverted.

A, Villous and cellular coats fairly cut through.

B, The peritoneal coat remaining.

C, An ulcerated hole in the peritoneal coat, which was a consequence of the injury.

This might have been produced by the long stricture of the gut in the tendon. It might have been the effect of too much violence in pressing the air out of the gut, before it was attempted to be pushed up: but I think I saw the finger so forcibly bored into the stricture, in attempting to push up the gut, as to bruise the softer inner coats of the gut.

PLATE XII.

This plate represents the manner in which the femoral hernia will sometimes rise from the depth of the groin, when freed of the integuments, and the binding of the fascia.

A B, The extent of the incision of the integuments.

C C, An aponeurosis dissected off the proper sac.

D, The hernia covered by the proper sac. The tumour is of a pyramidal form.

E, A cut through the sac.

PLATE XIII.

This plate represents part of the brain much diseased, from which a fungous tumour arose through an opening in the skull.

A, The tumour which protruded through the opening in the skull,

B B, On this part of the cerebrum which was contained within the skull, there is a disposition manifest to form the same fungous excrescence as in the part which had protruded.

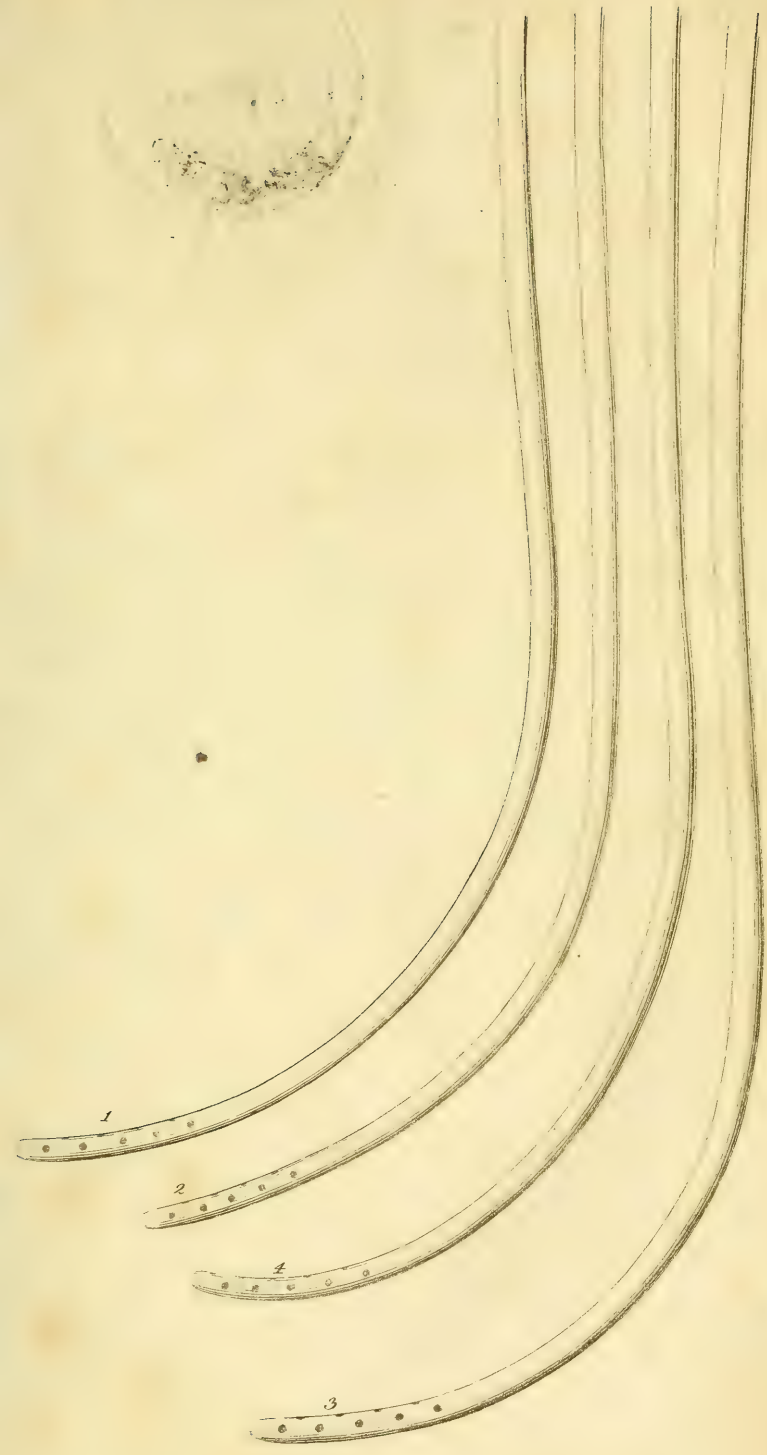
C, The lateral ventricle.

D, A sinus, forming a communication betwixt the ventricle and ulcer.

Plate XIII.

London Pub.d March 1807 by Longman & C.o

STEVENS'S
HOSPITAL
LIBRARY.



London. Pub.d March 1807 by Longman & C.o

STEEVENS'S
HOSPITAL
LIBRARY.

INTRODUCTION.

OF WOUNDS.

A WOUND is an injury inflicted on the body by external violence.

Distinctions arise in the nature of wounds, 1st, From the instrument, and the degree of force with which the injury is inflicted; and, 2dly, From the part which is struck. Under this last class is comprehended a variety of COMPLICATED WOUNDS, as when some important viscus is injured; when some great cavity is laid open; when a bone is broken; or a large artery is wounded.

We have in this place to attend to the distinctions which are referable to the former head.

CONTUSION.

IF a man has been struck on a fleshy part with a mallet, or if he has been struck with a brick-bat; or if he has been thrown from his horse, and has fallen on his buttocks—the effects are these: a bruising of

the soft parts; an injury and benumbing of the nerves; and a rupture of the lesser blood-vessels of the part, which produces an ecchymosis, or extravasation of blood into the cellular membrane.

Even in this simplest kind of wound, there are circumstances which a careless observer may neglect. To the full effect of a blow it is necessary that the resistance should be equal to the velocity of the impelled instrument; but where the parts yield, the shock is diminished, and the injury less considerable. Now, the integuments being soft and elastic, while the bone is firm and resisting, the injury sometimes falls upon the surface of the bones; or at least the soft parts immediately attached to the bone, are more injured than the elastic and yielding parts which lie more upon the surface. The consequence of this is, that sometimes concealed suppuration arises from bruises of fleshy parts, in which there appears little outward mark of injury*.

I have

* In my Lectures, I am in the use of giving a series of cases in illustration, beginning with this. A boy, while lying asleep on the ground, was trod upon by the foot of a fellow with coarse wooden shoes. When I saw the boy it was after some days. With excruciating pain, followed by shivering and fever, the thigh had become enormously swelled, but not in the slightest degree discoloured. The swelling was tense and elastic, and such as was very like the mere tumefaction of the inflamed muscles bound down by the fascia. Imagining that matter might be forming under the fascia, I made a puncture into it, but no matter flowed. Still suspecting what had happened, I pushed an abscess-lancet deep

I have said, that in a contusion the nerves are injured. This also requires some further illustration. This injury of the nerves gives a degree of dullness to the sensation, which immediately succeeds the accident; but afterwards it is the chief cause of the inflammation and pain. Further, the most inexperienced man has seen the effect of what is termed a concussion of the brain, and knows that this injury of the substance of the brain is followed by an interruption of its function. Precisely in the same way does it happen, though in a less degree, in the concussion of the nervous system of a limb. Thus, large stones thrown with great force, spent cannon balls, the beam of machinery in full motion, striking a limb—are sometimes attended with little pain, swelling, or discolouration; and even gangrene precedes high action. It is the same effect which we every day see when a man lies with a bad concussion of the brain and bruise of the scalp. The low

deep into the wound, and made it grate upon the bone, when the matter appeared. I then introduced a catheter, and afterwards a silver tube, by which I completely emptied the thigh of that matter which had been formed in consequence of the injury of the soft parts contiguous to the bone. I know by experience (having only a few days before seen the dissection of a man who died in consequence of a blow with a mallet, on the forepart of the thigh), that this matter would quickly have made the bone carious. Had this deep abscess on the bone and amongst the muscles been laid open by incision, the boy could not have survived; the inflammation which would have followed must have destroyed him.

state of the system, proceeding from the injury of the brain, prevents the inflammation or swelling from rising sufficiently to shew us the place of the injury.

If our patient has suffered contusion by falling, the first effect is a shock to the whole body; and there is sickness, languor, faintness, and debility*: then succeeds pain, stiffness, and fever, The part injured swells slowly, and from the ecchymosis there is marbled, black and purple colour. Towards the fourth and fifth day, there is softness in the centre, and around it there arises a hardened ring of inflammation. This softness in the centre might be mistaken for suppuration, and a collection of pus: but it is not; and if it be punctured, the wound will not heal kindly †.

The patient in this stage should be strictly attended to; for either there is an absorption of the extravasated fluid, and gradual diminution of the inflammation, or there is suppuration. If the injury is not very severe; if no parts are deadened by the bruise, and the extravasation is not too great—then the vessels throw out a serous effusion, which, diluting the extravasated blood, both are re-absorbed.

* In this state the landlady gives her dram; the surgeon bleeds; now, I think in this stage *she* is right.

† It is very important to observe this harder ring and soft centre in contusions of the head. The soft centre has often been taken for a depression of the skull, and the scalp cut open.

This

This liquid state of the effusion resembles the effect of suppuration *.

If the excitement of the vessels be continued after this exudation of serum, the secretion from them changes to purulent matter, and the centre of the cellular membrane, with the skin above it, is absorbed. This stage is marked by the swelling, heat, redness, throbbing, fever, and pointing or rising of the centre of the abscess †.

* If the injury of the part be very great; if there does not appear to be tumefaction in a degree natural to the injury; and if we fear gangrene before the parts recover themselves, and the vessels are excited; or if we have any alarms on account of the constitution of the man, perhaps a debauchee, or a dissolute, drunken fellow, who has fallen from his cart; then we use flannel, with hot and spiritous fomentations. If the parts have taken an undue action, and we wish to soothe and moderate it, then we must use leeches, cold cloths, and cold spiritous applications, which excite the surface gently, and at the same time take off the heat by evaporation. Lastly, if suppuration be begun, and we wish to induce a healthy action, and to bring the matter to the surface, we must confine the heat by hot poultices, and stimulate the surface by some acid ingredient. When a regular suppurating cavity is formed, and the disease is concentrating, open it; but if it be opened before this stage, the natural quiet action is interrupted. Such abscesses, therefore, are only to be opened early when we fear that the matter may lodge to the injury of some internal part, as for example, on the surface of a bone.

† The nature of the pain is changed; with the throbbing from the pulsation of the vessels, there is a sharp pricking pain.

Some-

Sometimes the shreds of cellular membrane are deadened by the bruise, or the high inflammatory action terminates in the death of some part of it. Then a *slough* is seen in the centre of the abscess when it bursts. This slough is not to be taken away, unless it confines the matter, or is likely to become putrid: the living parts will be excited by the contact of the dead. The living part will consolidate, ulcerate, and forming granulations, push off the slough.

When the skin is bruised, and the blood extravasated under it, the parts will sometimes mortify: but this mortification is of a less dangerous kind than that kind of gangrene which I shall presently explain.

OF A CUT.

The *sabre wound* forms a good distinction in wounds; for this kind of wound necessarily, from the curve of the sword, takes a peculiar form. This wound is what a surgeon would call a fair incision, deep in the middle only, and becoming gradually shallower towards the extremities. It bleeds freely but openly; what is injured is seen, and when the swelling and inflammation arise, and the suppuration forms, there is no binding of the flesh, and no internal mischief; the parts open outwardly, and the matter is freely discharged *.

OF

* In the treatment of this wound, the only difficulty of the young surgeon is to determine whether the vessels which

are

OF A PENETRATING WOUND.

A WOUND by a small sword or bayonet is the proper example. It is a wound which runs deep, but makes

are laid open require the ligature, or may be stopped by the mere dressing—whether the oozing will subside when the parts are bound up, or the hæmorrhagy will return when the faintness has gone off. He will no doubt be prepared with his needles to stitch the wound; but this is very seldom necessary where there is no loss of substance; and ligatures are always, when it is possible, to be dispensed with. Adhesive straps are better, with compresses laid longitudinally on the sides of the wound, so as to make the bandage act as a compress to the bottom of the wound. The young surgeon must study to place the parts in such a manner that the muscles which are cut will be relaxed.

If ligatures be necessary, they must be supported from cutting and irritating, by adhesive straps in the interstices; over these dry lint is placed, and a general roller is then applied to support the limb. But observe, that though the inflammation be moderate, this firm bandage is of advantage; if, on the other hand, the limb be unyielding and tight, and the parts continuing to swell, it is highly dangerous. In the same way, the ligatures must be watched, if the inflammation should rise above what necessarily accompanies the action of adhesion, then the swelling pulls upon the ligature, and they cut the flesh, and become a new source of irritation. The increased redness, heat, and pain, force us to undo all that we have been doing before, so as to allow of perfect freedom for this process. By and bye the inflammation and swelling of the parts subside; suppuration is established; and the compresses, with proper bandages, procure the

makes no large outward opening. These are generally the most complicated wounds, from taking their course among blood-vessels, entering the cavities, or wounding the bowels. But even considered independently of these risks, they are the most troublesome and dangerous in their effects, and the most difficult to be managed; for as they run under the fascia without cutting it, they produce deep and of course general swelling of the limb, which, from the binding of the fascia, occasions great pain, with tension, and contraction of the joints.

After this high inflammation, there comes deep suppuration, with sinuses running amongst the muscles, destroying the connecting cellular membrane, and requiring counter openings for their cure. The discharge is not of the consistence of cream, yellowish, and without fœtor, which is the character of *pus*, and such as we meet with in the instance of an open and healthy wound. For the treatment of these penetrating wounds, more judgment and knowledge of anatomy is required than in the cure of the others.

the adhesion of the granulating surface, by what is called the second intention.

Suppose that a wound is inflicted, or an operation performed, on a man with an ill-conditioned habit of body, the wound does not inflame nor become tumid, the pulse is hard and frequent, accompanied with thirst, restlessness, and languor evident in the countenance. Some days after the accident, the wound remains lax, flabby, and cold—there is no suppuration, the edges look livid, and the patient dies.

The

The great point in these deep wounds of the limbs (putting aside for the present all considerations of the hemorrhagy) is to attend to the strength and connexions of the fascia, or tendinous expansions which cover the limbs (and here I would refer to a full consideration of the anatomy of the muscles and fascia). For example, if a man has received a thrust through the back of the arm (the triceps), or through the back and inside of the thigh, or through the flesh of the shoulder—the swelling which proceeds from this penetrating wound will have full freedom, and there will not be the great pain in the first instance, nor the confinement of matter, tension, and distress, which arise from a wound of the same nature passing up the fore-arm, or on the outside of the hip-joint, and under the great fascia of the thigh or leg. Thus, in the cure of every wound, to have a thorough knowledge of the nature of the injury, and to form a true prognostic, we must combine the knowledge of the course and form of the wound, with a knowledge of the structure of the parts through which it takes its course.

PUNCTURE.

This wound is a species of the last; but I choose to make a distinction, because here there is little if any cutting; the flesh and fibres are not divided, but separated as by a needle, a sharp piece of wood, a bone, &c. The injury in this case may fall on the nervous system, producing tetanus; or in bad constitutions there may arise, from an apparently trifling

trifling wound, a very high and dangerous inflammation attended with high irritability and fever. The limb swells enormously, and the tendinous sheaths have an exudation in them which often leaves stiffness and adhesion, and contraction of the joints *.

Wounds of this kind sometimes produce a peculiar affection of the lymphatic vessels, marked by a red line on the skin, above the course of the lymphatic which is affected, and by a tenderness in the corresponding gland †.

When the effect of a wound is not entirely ascribable to the injury, as in the instance when the patient is pale and agitated, I think I have, with good effect, treated him as in the first attack of fe-

* Such in two instances has been the fate of my companions in the dissecting-room, from puncture with the hook.

† It has been imagined by some, that a puncture may be converted into a common wound, by cutting it open to the bottom. This I very much doubt. If no bad consequences follow such an every-day occurrence as the prick of a needle, or of a piece of wood, who would think of cutting into it? If tremor and convulsion follow such an apparent trifle, either the constitution is bad, or some of the minute nerves are touched by the point, which would not be relieved by laying open the wound. At all events, it soon ceases to be a local disease, and brings the body into such a state, that a scratch or cut of any kind, in any part, brings on a paroxysm of convulsion and spasm. It is better either to burn the wound with the caustic, or to produce suppuration if possible.

good

ver, by endeavouring to rouse and correct the tendency of the system. I have given a vomit, and then a stimulating draught of warm wine and aromatics, or an opiate; and instead of endeavouring to subdue the action of the part, I have applied stupes and warm spirituous fomentation to the wound.

LACERATED WOUND.

Such is the wound which a man receives when he falls on a stake, and the parts are torn up; or when gored by a bull, the horns entering the flesh and tearing up the muscles and tendon; or when a limb or part is torn off by machinery. The most striking peculiarity of this kind of wound is, that it does not bleed; which is thus explained: The injury consists not in the mere separation of the parts, as in a cut, but in the stretching and laceration which injures also the surrounding parts, and leaves not a fibre, vessel, or nerve uninjured for some extent around. The nerves are injured, and the sensation becomes dull; the arteries are paralysed, and do not contract upon the impulse of the blood; so that, as in dead parts, the blood settles and stagnates in them. The same effect is produced in open wounds, where an exposed surface is bruised. Both these kinds of wounds are on this account apt to resist a healthy action, and in that case the swelling is slight and general; the edges of the wound loose; the patient restless, and disturbed with slight delirium; and the parts, instead of suppurating, become black and

dry. Now there is a danger of gangrene, spasm, and locked jaw.

The tearing and exposure of tendons and tendinous sheaths is almost peculiar to lacerated wounds. Where these parts are cut, they shrink and are buried; but in lacerations they are often torn out, and lie relaxed. In the wounds and exposure of tendons and tendinous sheaths, there is some peculiarity. They neither bleed nor suppurate readily; and therefore probably it is that they produce dry and irritable wounds. Not being dead, and yet not prone to that degree of inflammatory action which is the natural consequence of the wound of a vascular part in a healthy body, their exposure is followed by untoward symptoms. The edges of the wound are hard and irritable; the discharge is gleety; and a dangerous spasmodic state of the system is apt to prevail *.

OF INFLAMMATION AS IT REGARDS THE FOREGOING DISTINCTIONS IN WOUNDS.

By the constitution of a living body, all wounds are attended with an irritation of the nerves, and a

* A harbinger of more violent and universal state of convulsion, is the slighter trembling and agitation of the tendons in the wound. Even a modern author has supposed this to be a proof of sensibility in these tendinous parts, and that this spasm begins with the tendons. But I should rather presume their motion to be merely the effect of the commencing agitation of their muscles.

consequent

consequent excitement of the vascular action of the part. This excited state of the vascular system of the part produces an increased sensibility of the nerves. The effect of wounds, therefore, in a *healthy body*, is an increased action of vessels; an unusual sensibility and increase of heat*; with swelling, pain, redness, and throbbing. This is the PHLEGMONOUS INFLAMMATION.

Resolution is the subsiding of inflammation, and the return of the action of the part to the usual relations. It is of course preceded by subsiding of the inflammatory swelling, and diminution of pain and heat.

In a debilitated and diseased state of the system, this healthy action (healthy, as being natural to a healthy body) is interrupted. Instead of a due degree of this phlegmonous tumefaction, heat, and redness, the parts are at first pale and flabby, and there runs a creeping dark coloured and diffused inflammation over the skin, which destroys the cellular membrane, and undermines the integuments, and is attended with a small, quick, and sometimes irregular pulse, and erysipelatous inflammation (erethismus)†. This

* This increase of heat seems to the patient, from the increase of sensibility, to be much greater than the degree of temperature appears to the sensation of the surgeon.

† We are to endeavour in this case to restore a healthy inflammatory action and suppuration, by warm cataplasms and spiritous fomentation. We must attend to the general state of the system; check this approaching debility by an emetic; free the bowels, as in fever; and then support the strength as much as possible.

is

is most apt to follow laceration and punctures, and is not unfrequently a precursor of gangrene.

This kind of erysipelas, is very apt to occur from punctured wounds of the head, especially when the constitution is bad, or the patient is laid in a crowded hospital. This inflammation is preceded by pain and a diffused swelling of the integuments around the wound; sometimes the pain is dull, sometimes there is an acute and prickling pain. There is nausea, loss of appetite, and foul tongue, which when present is a demonstration that this is not a local affection.

The inflammation and slight swelling of the integuments sometimes extends over all the head and face, and even spreads to the neck; the pulse is small and frequent; and if it still increases, there is a comatose state, and even low delirium.

Erysipelas attacking the skin, independent of previous injury, commences its attack with nausea, slight rigor, heat, thirst, and restlessness. At first the quickness of the pulse would indicate the propriety of evacuations: but if the pulse be sunk suddenly by bleeding, or the strength reduced by purging, the worst effects are to be dreaded. And this case may be considered as very desperate, when in a bad habit the skin is of a dark or dusky red colour, or purplish; has a soft doughy feel, and is little sensible; when the pulse is unequal and faultering, and there has been rigor, or irregular shiverings, with lassitude and feebleness, and an inclination to dose.

The

The phlegmonous inflammation is a symptomatic and necessary action of the living body under injury; the erysipelatous is a peculiar disease, and though remotely it may proceed from wounds, yet I believe it is always a direct effect of the state of the system, either previously existing or consequent upon the injury. The surface in erysipelas, as I have said, has a doughy, soft feel, without tension, as in phlegmon, and it may be distinguished by the want of throbbing, and the redness vanishing on pressure. When it is proceeding to excess, vesications arise. It is still worse when the bases of these become livid.

When speaking of the erysipelas of the head and face from wounds, it is impossible to neglect the observations of Desault on this subject. But what I would now more particularly notice, is that relation betwixt these injuries of the head and the general system, betwixt the affection of the brain and the gastric organs, which he points out, and which no surgeon should for an instant neglect. These affections of the scalp, he observes, are not local diseases; there is betwixt the scalp and brain a sympathy. The stomach and liver is affected; the system at large suffers from the disease of these organs; but the consequence falls with peculiar power on the injured integuments. For understanding this sympathy of parts, and circle of connexions, our attention is called to the state of the bowels in all those apparently local affections, which seem to have some peculiar malignity, or which obstinately resist the common treatment.

But

But more particularly still ought the student to regard the observation of Mr. Abernethy, to whom, on this subject, more than to any other man, we are indebted. He has examined the body, while under the influence of surgical diseases, in the true spirit of medical scrutiny. He has greatly assisted in raising the importance of the art, by giving it principle, and a foundation in science.

Suppuration, the discharge of pus from inflamed vessels, is preceded by an exacerbation of the symptoms of inflammation, rigors, shooting pain in the part, and increased throbbing. It is followed by a remission of the general tumefaction, and swelling, and redness. In regard to an open wound, as the serous discharge is converted into a thick, white, mild matter, the lips of the wound lose their tension (yet are not loose nor flabby), red and healthy granulations appear; bye and bye, this mild discharge continuing, a film of coagulable lymph is found attached to the surface when the pus is cleaned away; and this is the second stage preparatory to adhesion *. When by intemperance and mismanagement the healthy

* The pus is thrown out from the same vessels from which the serous discharge flowed, and the change from hæmorrhagy to serous discharge, and from that to pus and coagulable lymph, is gradual. But it is more important to observe at present, that if there arise a new source of irritation, or if the inflammation be increased, the discharge of pus is again stopped; and that if the discharge is profuse, with a looseness of the lips, the parts must be stimulated and supported, before they will afford a due discharge of coagulable lymph to produce adhesion by the second intention.

action

action is checked, the parts become loose and pale, or hard and irritable, and the discharge grows thin and ichorous.

In large extensive wounds, a profuse suppuration often follows the mild secretion of pus. Then there comes a large gleeting sore, a declension of the health, and hectic fever, attended with diarrhœa and night sweats.

External parts assume the changes consequent upon wounds more rapidly than internal parts; and sometimes the skin has run its changes, and is healed, while sources of irritation and suppuration remain deep in the wound. On the other hand, if adhesion is not procured at the surface, it is difficult to ensure it in the depth of the wound; because whatever the disposition to action is at the edge of a sore or wound, it is apt to run by continuous sympathy to the bottom. Our general rule, therefore, is to procure adhesion, but to provide a depending orifice, if we are in expectation that matter will be formed; or carefully to watch the local and constitutional symptoms of the formation of abscess, when we shall have entirely closed the wound.

In regard to the formation of matter deep in the body consequent on wounds, there are distinctions to be observed arising from the different natures of the two inflammations, which may have been produced. An abscess or collection of matter consequent upon phlegmon, is attended with adhesion of the cellular membrane which confines the fluid; and though it has a tendency to the surface, and falls naturally

turally downward, yet this progress is gradual. But when erysipelas follows a wound, its course is irregular; it has no natural termination; and it will insulate the skin from the part below, and destroy the cellular membrane with a rapidity which the young surgeon does not look for. The suppuration, if such it may be called, which attends it, is accompanied with an irregular dissolving of the cellular membrane, and sloughing, and to the feel it is soft, quaggy, and irregular*. This inflammation runs along the surfaces, destroying their natural action, and (unlike the phlegmon which terminates by producing adhesion and coagulable lymph in the surrounding parts) it has no termination to its action while the disposition remains. It attacks surfaces chiefly; such surfaces, when capable of high action, as the skin, are inflamed; but in the cellular membrane, which is a part of which the vessels are en-

* For example, a man tore the skin on the outside of his knee, upon a rusty nail. The inflammation was slight, but the wound shewed no disposition either to heal or to suppurate. It became irritable, and a dark inflammation surrounded it. This diffused itself upon the thigh, even to the haunch, attended with very little tumefaction. A bad discharge followed; and now the probe passed upwards a great way, and the whole outer skin of the thigh was separated from the fascia. Had this wound been of a different nature, had it taken a phlegmonous action, then the matter would have formed about the insertions of the tendons, insinuated itself backward behind the joint, and dropped down gradually between the heads of the gastrocnemii.

dowed

dowed with little activity, it creeps from cell to cell, and often kills it; the skin soon loses its support, and mortifies in large flakes. I have seen the whole side of the head, or the integuments of the outside of the thigh, fall off in black flakes.

APPROACH OF MORTIFICATION.

The approach of mortification or gangrene is betrayed by a remarkable but indescribable change in the patient's countenance; often a peculiar wildness of aspect; and anxious, delirious look; great languor and depression; vomiting; a quick, thrilling, compressible, intermitting pulse.

I shall first suppose that in *anasarcous swelling of the legs*, and great debility of the system, attended with a small fluttering pulse, a spot is seen, watery, and in which first the distended thin cuticle disappears; and afterwards little grains or spots, of a black purple or lake colour, are seen on the surface. This is the beginning of mortification. This spreads with a marbled mixture of blue, yellow, and dark red colour. Then other spots form; the pulse becomes very low and tremulous, and the patient sinks *.

Gangrene often begins in a small black spot, and

* The surgeon must therefore study the strength of the constitution, and cause of the œdema, before he ventures to puncture or scarify; for this mortification is peculiarly apt to follow that operation.

the extent of the part immediately tending to the same state, is marked by œdema, or emphysematous inflammation of the cellular membrane.

In consequence of *obstruction of circulation* after the tying of a great vessel, or of the pressure of a tumour, &c. the circulation being obstructed, though not stopped, gangrene attacks the limb. The pulse is quick and vibrating, and compressible; the countenance pale, thin, and fallen; the limb, œdematous, lies soft and dead-like; the colour is a dark or obscure red; shooting pains are in the toes or fingers (and sometimes a rigor); new streaks of a deeper red, without any tumefication, may be seen, and then a vesicle appears, when the redness subsides. This vesicle discharges a brown fluid, and the surface beneath is a dark purple or brown; the toes or fingers have vesicles on them; become black and shrink.

Extreme cold, by abstracting the heat from the living surface more quickly than it can be generated by the circulating vessels, produces mortification*. The parts die from a cessation of irritability. There is no obstruction, and no great discolouration †.

Mortification

* Lesser degrees of cold than are sufficient to procure mortification, especially if heat be improperly applied, will bring on redness and tingling, œdema and lividity, viz. chilblain. Sometimes it produces a serous effusion, and raises the cuticle; and then follows a painful ulcer.

† If heat be applied to a frost-bitten part, then the sensible

Mortification of Sores. When the granulations of ulcers mortify, we see in the prominence of the granulations a small black spot, or a speck of dark coagulated blood extravasated: then the granulation fades, and the good discharge fails. At the next dressing, the bottom of the ulcer is foul, with white or greenish shreds of the dead substance; and rapidly extensive wasting of the skin follows; and the tendons or muscle hang relaxed out of the sore. There is a softness in the whole limb, and total want of action. The patients in whole wards of a foul hospital, will be thus affected, and a healthy sore will, in the course of a few days, assume the appearance of a half-dissected and neglected limb on a dissecting table *.

sible parts only are roused to action, and the redness which appears above the mortified place is a mark of the bad effects of this treatment, and the danger of the insensible and frost-bitten parts becoming absolutely mortified. The inference to be drawn from this is plain, that heat (a stimulus) must be very gradually applied. Let us take the opposite accident to this, a burn or scald. Here is high excitement, and our application ought not to be such as may produce a rapid diminution of the beginning inflammatory action. Instead of cold application, hot and stimulating are to be used; and these are to be gradually lowered to the scale of natural action.

* When this attack is made, the patient should have an emetic, and then a cordial draught, or warm wine and spice; be removed if possible, and a spirituous fomentation put to the limb, and afterwards the carrot poultice to the sore.

The

The accession of gangrene following concussion of a limb from extensive gun-shot wounds, or cannon-shot, is preceded by a heaviness, slight œdematous swelling, and leaden colour of the limbs. There are in several parts dark brownish spots or stripes. There are then lancinating pains: the skin blackens, and the cuticle separates. At first the patient is dull and insensible; afterwards there is distress and inquietude. The paleness and lowness in this instance is owing to the shock given to the nervous system. In the effect of cold, there is an obscure red and purple colour, with darkness of the nails; but here the paleness of death is on the countenance, in the eye, the nails, and the wounded limb.

There is a mortification in the toes and feet of old people, which, in the words of Mr. Pott, is unlike that from inflammation, from external cold, from ligature, or bandage. In some instances, it commences with little pain; but often is preceded by uneasiness in the foot and ankle, especially during the night. The visible commencement is on the extremity or side of one of the lesser toes. There is a small black spot, then the cuticle is detached, and the skin under it is of a dark red colour. In a few days, the progress of the gangrene from toe to toe, and along the foot, is rapid, and proportionally painful *.

* It is a disease of debility attacking the extreme part of the vascular system. The system must be supported by repeated opiates, while the part has the mildest fomentations. To stimulate is to endeavour to excite an action which the vascular power cannot sustain.

*Mortification sometimes follows high action**. The parts have a florid red colour, and erysipelatous inflammation spreads around. There is sometimes high irritability, delirious restlessness, and great pain; then vesications arise: then the pain and inflammation diminish, and the pulse sinks. The symptoms are sometimes ushered in by rigor, and a flushing of the face. The patient sometimes lies comatose before his death. If there be an extensive wound, a flaccidity of the skin, with dryness and livid colour, precedes. If there is an ulcer, it becomes dry and discoloured*.

In saying that mortification sometimes follows high action, I am proceeding more upon authority than I ought; for I have not seen gangrene the consequence of high inflammatory action: it should rather be called high irritation, which disorders and overcomes the inflammatory action, and is followed by mortification.

* Practically considered, there are two views to be taken of this subject. When a limb is shattered, and we dread high inflammation, certain that if it is once allowed to gain a footing, there will be great danger, we endeavour to ward it off by cold applications, bleeding, and keeping the patient low. But if the inflammation has made its attack, and is running into gangrene, we should try to secure a full suppuration by fomentation of the limb, while the general action of the vascular system is mitigated. In gangrene, however produced, we must support the strength by wine and brandy (taking care not to raise a flush on the cheek, or produce drunkenness, which will be followed by debility), and by bark and acid, guarding the stomach from oppression, and the bowels from flatulence.

There

There are, however, frequent instances of that swelling and binding of the parts, the consequence of the infiltration into the cellular membrane, and as it were suffocation of the arterial action, which is followed by gangrene of the limb. This is particularly frequent after gun-shot wounds, and occasions us to make deep incisions, to unbridle and give freedom to the parts. The practical surgeon will have often to trace the gangrene to the improper bandaging, some times merely to the binding of the splints in fracture; often to the close bandaging of lacerated wounds, with a hæmorrhagy, which has required the firm compress and bandage. When a swelling and dark-coloured inflammation of the skin is seen betwixt the turns of the roller, they should be immediately undone.

Sphacelus is the complete state of mortification, with derangement of structure from the prevalence of other laws than those which characterize the living body.

OF CARBUNCLE.

The carbuncle begins on the surface, like a pimple; but in its progress it goes deep, and spreads wide, having its base in the cellular membrane, and it is attended with a peculiar thickening of the skin, and redness. The centre of the disease is fixed: it does not shift, though it spreads until it forms a flat and broad tumour. There is matter formed, but it is contained in cells of the membrane, and not as an abscess; nor is it diffused, as in the erysipelas.

There is not a pointing of the tumour, as in phlegmonous

monous abscess; but the surface becoming more dark and livid, a number of openings form on the quaggy cells, which discharge the fluid.

The carbuncle forms commonly on the trunk, generally on the back, or on the nape of the neck, or over the stomach; seldom on the head or extremities. In short, it attacks the integuments where they are naturally much insulated from being over tendinous expansions, or fascia. It has been considered as almost peculiar to the debilitated state of the rich and luxurious.

OF ABSCESS.

An abscess is a suppuration where the matter is collected, and where there is at first no outward communication. Its seat is in the cellular membrane. It is a process of the phlegmonous action, and whilst the vessels pour out the pus, the inflammation condenses the surrounding soft parts, so that by the pressure of the matter, and the action of the vessels, and the throwing out of the coagulable lymph, a regular cyst is in time formed, which contains the matter of the abscess. An abscess is formed in these stages. 1. There is increasing redness, heat, tension, and throbbing; the whole system is highly excited; one or more rigors succeed. 2. The irritation and fever subside, and there is relief of pain; and now if the abscess be superficial, there is a redness observable on the surface, it *points*; ulceration takes place in the skin; it bursts and discharges, to the more perfect relief of the patient. 3. If the abscess be of great extent, this relief is transient; in

in about forty-eight hours, an ichorous discharge takes place of the pus, with pain and constitutional irritation. This stage has been called the secondary inflammation of the abscess *.

Although the walls of an abscess have been in an inactive state for months, becoming as it were naturalized parts of the system, yet immediately upon being punctured, a rapid change begins. This change is produced not from the admission of air; for it will take place in circumstances where air cannot be admitted, but in consequence of continuous sympathy, and of the whole internal surface partaking quickly of the action of the lips of the opening. If therefore the lips of the opening into the abscess be made to adhere, after evacuating the matter, the cyst of the abscess will not inflame. That it proceeds not merely from the circumstance of an opening, may appear from this—Suppose that we have a fistulous opening communicating with sinuses, and that the sinuses are callous, by making an incision in the mouth of these tubes, the whole cavity is excited, and by taking advantage of this we procure adhesion; or suppose that an extensive gun-shot wound has fallen into a quiet state, by making incisions we interfere with the process of nature, if we make our

* Even in large abscesses, while the cyst is entire, the constitution sympathises very little but upon this change of the nature of the discharge. The hectic fever is rapidly increased, the daily remission less apparent, the evening accession more severe, and the night sweats more debilitating.

openings

openings and counter-openings, and the more active inflammations arising from these incisions will affect the whole surface, and rouse the wound to dangerous activity. The general proposition stands thus—nature cannot support two distinct stages even of a similar action on the same surface; and if a more active state is induced at one point, it will spread to the whole surface *.

What is here said of abscess, if correct in doctrine, applies equally to the case of wounds penetrating the cavities. If the belly be punctured, and air blown into it, the air will be absorbed; and if the external wound heal, all fear of bad consequences ceases; but if the wound festers and suppurates, there is great danger of inflammation spreading to the whole cavity. Some have conceived that the inflammation of sacs and of abscesses, in consequence of their being opened, is owing to the air coming in contact with the internal surfaces; others that the phenomenon is to be accounted for by the access of the air to the matter of an abscess, and that it facilitates its corruption. This is a remark worthy of particular attention; but it forms altogether a distinct question, since the same change will be produced by opening a

* It is this principle which should make us hesitate in disturbing great wounds in their natural course, by teazing operations and dressings. It is this principle also which makes the surgeon open a large abscess, by a small puncture in a healthy part of the skin, that he may procure adhesion after it.

joint

joint in which there is no pus, as by opening an abscess *.

The matter of an abscess has always a tendency to the surface. This is the effect of an ulcerative process, attended with an absorption of that part of the stool or cyst which is next the surface. I conceive the cause of this to be the greater sensibility and proneness to action of the surface. The deeper parts have less sensibility, and less proneness to take the changes of inflammation †. By promoting the sensibility and action of the surface, we facilitate the pointing of the abscess.

The fascia, a membrane of no sensibility, and of firm texture, long resists the ulcerative action in collections of matter; a fact which the surgeon must never for a moment neglect; for the matter being

* In all our best books of surgery of the old school, there is a uniform prejudice of the consequence of the wound of *membranous parts*—an alarm that they are highly dangerous, and that they seldom digest but with some hazard. This is strictly true; for where are these membranes but around the viscera, and in the structure of joints; and these are parts certainly where wounds and inflammation are highly dangerous. Membranes are continuous surfaces, and in as far as they regard the dangers of inflammation, mean much the same thing with cavities.

† When matter lodges deep in a limb, and under heavy muscles, it has less tendency to point towards the surface, and is particularly dangerous from lurking inactive there (or rather with no sensible effect), and spoiling the bone. The effect of the greater sensibility of superficial parts, is a subject which would require a dissertation of itself.

resisted

resisted in its progress to the surface, will work amongst the cellular membrane, insinuate amongst the muscles, and burrow deep under the tendons and fascia.

Hectic fever accompanies the formation of abscess, and is increased upon its being opened. It has been supposed to proceed from the absorption of the matter; but it corresponds better with a more extensive review of the effects of disease, to say that it is the constitutional sympathy, with a continued low degree of local irritation. Hence painful affections of the bones and joints, where there is no matter formed, produce hectic.

In hectic fever there is a small, sharp, quick pulse, with pale skin and loss of appetite, with frequent debilitating perspiration. There is no regular intermission, but there are exacerbations, preceded by a slight degree of cold stage. The fever is increased about noon; but especially towards the evening there is an increase of symptoms, and towards the morning they abate. As the disease advances, the night-sweats become profuse and debilitating, and a diarrhœa comes on, with a rapid increase of debility.

Although the system be thus irritated, so as to produce the greatest degree of debility, yet, as it is a symptom and consequence of a local affection, it might be supposed that, on the removal of the diseased part, the local irritation would in every case be succeeded by an immediate change, and restoration of healthy action. It would, but that often (as by

by operation), to remove the cause of the disease, we substitute another source of irritation.

SINUS AND FISTULA.

Collections of matter, when deep-seated and neglected, or improperly treated, instead of filling only one cavity, spread irregularly where the connecting membrane yields most easily to the action. If the abscess burst outwardly, the opening is small at first, and having discharged the matter, the orifice contracts, becomes hard around its edges, continues to drain off the secreted fluids of the cavities, which cavities and sinuses acquiring a habitual action, become hard or fistulous.

The sinus, then, is the abscess taking a course under the skin, or amongst the deep parts. The fistula is the consolidation and hardening of such channels, by habitual discharge, and becoming a deep, narrow, callous sinus, with a sanious, often an acrid discharge.

This is a change most generally produced by neglect or bad management in the dressing, oftener by intemperance and debauchery, or a debilitated or distempered constitution. We in the first place turn our attention to the confined, impure air, bad clothing, and filth and bad diet; to the palid countenance of the patient, and his nightly feverish condition, and the state of his bowels, &c. before we think of the knife.

If improper dressing has made of an abscess or sinus, a fistulous sore, the lips will be hard and inflamed

flamed on the edges, or tumid and inverted; the discharge great in quantity, and thin and ichorous; the pulse will be hard and quick; there will be thirst and sleepless nights. Then there must be no stuffing with precipitate and dressings, but soft slips of dressing, with milder ointment introduced upon the lips of the sore, and covered with a softening poultice.

CHARACTER OF GUN-SHOT WOUNDS.

A GUN-SHOT wound differs in its character from any of the wounds which we have already delineated, and yet partakes occasionally of them all. The parts may be bruised, as by great shot; they may be cut and torn up by splinters, and the parts pricked by the spiculæ of bone, so as to partake of the nature of a punctured wound; they may be simple, as in fleshy parts, or compound, as having fractured bones and bleeding arteries, or the great cavities laid open.

OF A WOUND BY A BULLET.

1. THE transit of a bullet through a limb is made with a rapidity so foreign to our usual course of sensation, that no pain, or even distinct sensation, is conveyed. The blood does not follow, as in another wound, because the vessels and nerves are paralysed by the concussion of the bullet in its passage, and closed by the bruised parts shutting up

the mouths of the vessels*. 2dly, The appearance of the wound is like that made in a dead body; only that there is around the orifice a slight blackness in the integuments, and the black cellular membrane fills up the orifice.

We have already observed, that inflammation and pain go together; and in this kind of wound, as there has been no pain, neither will there be inflammation for some time. The parts are deadened by the velocity of the obtuse body passing through the limb; a *living part become dead, is as a foreign body in a wound;* and therefore a gun-shot wound must inflame through all its length, to separate and void this slough; and as there are not living surfaces to bring together, there can be no union until the slough is discharged. Or let us take it in another view: a bullet being an obtuse body, forced through the limb, and taking none of the substance away, the parts are by its transit pushed aside and bruised, with a violence and velocity that entirely destroys their vitality, and suppuration must be counted as a first step to recovery.

As it is the velocity of the ball which produces the peculiar character of this wound, and as the force of the ball must be somewhat spent in its passage, the part at which the ball makes it exit, will be

* Even irregular pieces of lead or slugs I have seen pass through the arm without a drop of blood following; but this does not always hold: the comrades of the wounded man sometimes perceive the blood, while he himself is unconscious of a wound.

less

less distinguishable from the nature of a common wound than that at which it entered: accordingly, this orifice assumes the necessary actions more quickly, and heals sooner than the wound by which the ball entered*.

OF THE COURSE OF A BULLET.

The passage which a bullet makes is very seldom direct; for, being a spherical body, a very small degree of superior resistance on either side changes its course. If it strike a spongy bone directly, it will lodge and enter into it, as into the vertebræ, or the heads of the thigh bone†. But if it strike a bone with an oblique direction, it will be flattened; and, slanting off, will cut into the soft parts‡. Some-

* Sometimes the counter opening, where the bullet passes out, heals by the first intention.

† This is an accident which, in the end, occasions a very puzzling case. A poor fellow returns from a campaign with a stiff and inflamed joint, and is hectic through extreme pain; but he has no other information to give, than that he received a wound there, and the ball was never found. Whether it may be lodged and covered in the bone, or lies in some of the numerous sinuses, which have now formed around the joint, it is difficult to determine: and too often this state of matters is followed by fruitless probing, and more dangerous, though equally ineffectual incisions.

‡ Instead of having a ball to feel with the probe, or extract by the forceps, it cannot in such a case be drawn through the hole by which it entered: it has become a flat and irregular piece of lead. I say cut into the soft parts, because it has lost the obtuse form, and much of its velocity.

times the ball is fairly cut in two by striking a spine of bone, as the edge of the tibia Where a ball strikes a bone, though obliquely, it deadens the part. A spent ball is more apt to splinter the firm bones than to enter them. When a ball is turned off from the surface of a bone, it is very apt to take an oblique course amongst the cellular substance, and run a long way under the skin. When a ball has passed through a limb, or even through the body, it will be prevented from passing out by the elasticity and softness of the skin, so that we feel it under the skin opposite to the place at which it entered.

In a very few hours after the infliction of the wound, if the bullet has passed along under the skin, we may perceive a red stripe on the skin over its course*.

OF INFLAMMATION FROM GUN-SHOT WOUNDS.

The tract of the ball has formed a dead case or tube, which, lining the sensible parts, the contact and irritation of any foreign body in the wound is

* A man was shot with two small bullets in the outside of the fore arm, and one of them passed through the arm. Whilst I was feeling for the other under the integuments on the inside of the fore arm, near the hole made by the exit of the other bullet, I observed a streak of inflammation in the course of the outer edge of the biceps muscle, and terminating at the insertion of the deltoid muscle. At this last point the bullet was obscurely felt, cut upon, and extracted near the shoulder. Having struck the bone, it took a new course, running up under the integuments.

not felt nor followed by inflammation, whilst this eschar is formed by the attrition of the ball: those parts contiguous to it, which remain alive, are yet benumbed, and there is a pause in their action before they begin to inflame. This is a period in which the surgeon may use freedom without any risk of giving pain. But even at this stage, a teazing interference and frequent probing or incision will accelerate the inflammation, and bring on an action too early, and before the sound surface is disposed to separate from the sloughs: it may, consequently, produce a violent inflammation*.

With the rising of the inflammation, what was like a plug choaking the wound, begins to gleet and discharge. By and by, about the sixth or seventh day, the slough protrudes from the wound, and suppuration is established. The dead parts have, in all probability, separated, but they still remain in the wound a source of irritation, so as often to obstruct the discharge which ought now to be free. If the discharge be free, the granulations will soon shew themselves, and the wound retain no further peculi-

* In like manner, when the bone is shattered by the piece being driven amongst the flesh, a more immediate inflammation is occasioned; for the wounds made by the bone are like common wounds, and the spiculæ lie in parts vascular, and capable of immediate action.

When wounds have passed the violent stage of inflammation, scarifications produce a change favourable for healing, in consequence of a new action excited in the cuts, and by sympathy and the direct communication of inflammation to the whole surface of the torpid sinuses.

arity of the gun-shot wound than its depth and narrowness.

Now it has become a tube alive in all its extent, and if any piece of cloth or sharp point of bone remains, they keep up an irritation and a gleety discharge instead of good pus*.

In SHATTERED LIMBS, and in WOUNDS WITH CANNON-SHOT in their first stage, and in complicated wounds with GRAPE, requiring amputation or operations with the knife, there is a circumstance which must be distinguished as peculiar.—The benumbing and cold indolence proceeding from the concussion of the part; the patient is taciturn and pale, with his eyes fixed; the wounded limb is pale and colourless, and without feeling. Here we are enjoined to restore the sensibility of the limb and the powers of the system, before any operation be attempted. When, however, we are freed from anxiety on account of this nervous affection of the limb, and of the constitution, we have to dread the over action of the parts and of the system, and must endeavour to retard the violence of the accession, and restrain the high inflammation. By bringing the inflammation mildly forward, we ensure a happy suppuration, and the separation of the injured parts.

The last peculiarity of gun-shot wounds which I shall enumerate, is the possibility of hæmorrhagy coming on when the suppuration is established,

* Of the complication of gun-shot and fracture, see the title FRACTURED BONES.

and

and the slough is throwing off; for the bullet may have grazed a large artery, so as to destroy the coats without intercepting the flow of blood through it; and, consequently, when the slough is thrown off, the blood bursts out unrestrained.

When good suppuration is established, all distinction of wounds, so far as proceeds from the nature of the original injury, is done away; and the sole peculiarities which remain, have reference to the nature of the parts wounded. Here the intelligent knowledge of anatomy is that which alone can give confidence to the surgeon, or enable him to perform his duty to his patient. For example, the character and dangers of wounds of the head, of the lungs, and of the abdomen, the wounds of great arteries, and the complication of fractured bones and open wounds. The difference of wounds in tendinous parts and muscular flesh, of parts covered and bound down by strong fascia, or of a muscular part which is left free to assume the necessary degree of tumefaction*.

In

* By the intelligent knowledge of anatomy, I mean not a knowledge of vessels in their course merely, but of their relative situation; of the peculiarity of structure and function of parts; and of the distinctions which mark them under disease. This kind of knowledge forms the subject of the author's lectures on the living body. He shews the probable course and direction of wounds; the parts through which they will naturally take their course; the combinations in particular instances of the effect to be apprehended from the

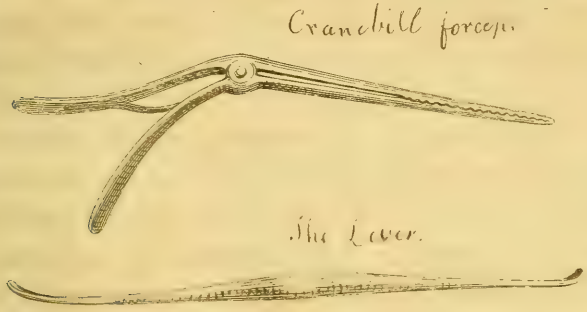
In all his difficulties, the surgeon has still to hold in his recollection the stages and progress of a gun-shot wound, as they relate to operation.

When the wound is first received, the inflammation and pain has not yet arisen. If the ball is to be felt distinctly, it is to be extracted. But we have to remember the difficulty of ascertaining the place of the ball, especially if it be flattened and irregular, as when it has touched a bone. If we can touch it with the finger, there can remain no doubt of the propriety of its being extracted. If it can be felt in the part of the limb opposite to the wound, there can be no doubt of the propriety of making a counter opening for the purpose of extracting it. This opening will quickly heal, and it ought to be allowed to bleed freely. In the operation of extracting the ball, forceps should, if possible, be laid aside, and the spoon or lever used, fig. 1. The forceps, which are generally made for the extraction of balls, (those, for example, which Mr. Chevalier has engraved in his book, and which he says are now generally sent out with the field apparatus) seem to me very useless. Indeed, I know from experience, and from the concurring testimony of army surgeons, that they must be often laid aside,

the nature of the wound, as here slightly laid down; with the nature of the part wounded. This is necessarily attended with a review of the whole anatomy of the body in the most interesting and useful form; and even to the student in his closet, it will be found of the most essential service to prosecute his inquiries in this way.

and

and the common dressing forceps in most cases preferred. If we have to unfix a ball from its place, the lever is certainly the instrument best adapted for the purpose; and, afterwards, the extraction ought not to be an operation requiring strength. If it cannot be done with a long pair of common dressing forceps, one of the old crane-bill form will be useful*.



Nothing is more apt to deceive than the feeling of bones shattered by gun-shot. We touch a splinter with the point of the finger, or feel it loose to the probe; but if we attempt to draw it away with strong forceps, we find, in all probability, that there has been a splitting up of the bone, and that we have got hold of a very principal part. Even when loose, these pieces are found to require extensive incisions to extract them, or the parts are torn as the pieces of bone are drawn forth. I question very much the propriety of tearing away even lesser pieces, when they adhere to the soft parts.

* The ball forceps should have a groove towards the point, which may allow the surgeon to slip them along the probe as a directory.

The

The second stage is that in which the first inflammation rises to its height. All things considered, I can see no occasion for incisions, except when the pain is extreme, with strong binding of the inflamed limb by the fascia; or where abscesses are forming in the tract of a raking shot, which has taken a course under the fascia. This extreme pain and bending of the fascia may change the nature of the inflammation, and gangrene may follow; or, what is more common, the violence of the inflammation will lay the foundation for extensive abscesses amongst the muscles and bones, which in the end may destroy the patient.

When suppuration has followed a due degree of inflammation, but the inflammation has again arisen in consequence of renewed irritation; or where a profuse discharge seems to be kept up, this makes a second stage in which the examination of the wound will be necessary: and now, in all probability, the dead bones will be found loosened, and the pieces of the clothes or other foreign bodies will appear in the tube of the wound, enabling us to account for the outward symptoms. The fistulous abscesses which remain long after these penetrating wounds, must be managed according to the general principles of surgery*.

* In concluding these initiatory views of wounds, and especially of gun-shot wounds, I should feel the impropriety of the shortness and briefness of my remarks, if I had it not in my power to refer to the more particular information contained in *Discourses on the Nature and Cure of Wounds*, by Mr. John Bell.

SHORT

SHORT NOTICES REGARDING THE STOPPING OF HÆMORRHAGIES.

The first point concerning which the pupil requires information, is the *fainting* from *hæmorrhagy*. He will soon find that, from an oozing of blood, an amazing quantity may be lost without the patient fainting, because whilst the blood flows thus gradually, the vessels contract equally over the system, and the heart and great vessels of the chest do not feel the loss, nor suffer any collapse. But when a great vessel is wounded, a few pulsations, the losing of a few ounces of blood, will so drain the heart and great vessels of blood, that the patient immediately faints*.

A friend seeing the patient faint, catches him up, but the surgeon lays him horizontally, by which means the blood flows more easily from the extremi-

* Thus I have seen in amputation, high in the thigh, in consequence of a mistake in the application of the tourniquet, a few jets of blood, full from the aorta, followed by a deep groan, and a fatal fainting. The man did not, indeed, immediately die, but he never recovered. It does not require the bleeding of an artery to produce this sudden effect. The bursting of a varicose vein in the thigh, in the course of which the valves have lost their power, has been suddenly fatal from the descent of the whole column of blood, which should supply the heart. The circulation within the head is instantly effected by that tension which prevails naturally in all the vessels, being suddenly taken off.

ties

ties to supply the heart, and the ascent of the blood to the brain is facilitated. Cold water sprinkled on the surface causes a contraction of the extreme vessels, and a shock to the relaxed surface, which throws the blood to the centre, and at the same time it excites the nervous system *.

The surgeon will not endeavour to revive the patient from his fainting fit before he has secured him from a return of the hæmorrhagy: he will often have to take advantage of this suspension of animation and feeble state of the circulation, to accomplish the ligature of the vessel.

Towards the end of an operation, when the chief arteries have been secured, a little wine and brandy is given to restore the full action of the system, that all the arteries may bleed now which might otherways bleed after the dread and the coldness from exposure were removed.

During hæmorrhagy, there is an undulating, soft, and compressible pulse. When the bleeding is extreme, and passing to a dangerous state, the paleness of the face is accompanied by an anxious wildness or delirious look, which should command immediate attention †.

* When death is dreaded from inanition, the scene changes, and stimulants to the nose and fauces, hot water to the feet, chaffing of the limbs, and stimulating injections are used.

† These marks become particularly important in internal hæmorrhagy.

OF BLEEDING FROM DISEASED SURFACES.

A VERY distressing occurrence is the bleeding from ulcerated surfaces, from deep ill-conditioned wounds, or from the cavities of bones. When a sore takes a sloughing disposition, it sometimes lays open great arteries. If the needle be used, it is driven amongst soft and dead or yielding parts, and the vessel again bursts. This hæmorrhagy occurs in a state of the system, in which the loss of a few ounces of blood may be fatal. Sometimes we have it in our power to tie the trunk of the artery; for example, when there is secondary hæmorrhagy after amputation, in which the styptics and dossils of lint, and the graduated compress and bandaging will avail nothing, and in which the tying of the bleeding artery will be attended with repeated and sudden burstings forth of the blood. In this case we must make an incision through the sound skin of the limb, and tie the artery *.

It is chiefly in bleeding from spongy fungous surfaces, or from sloughing sores or wounds, that styptics are used, applied on lint †, and above them a sponge and bandage. In the extirpation of spongy tumors from the jaws, with obstinate bleeding, or

* Mr. Lynn, of Westminster, has twice, in bad sloughing stumps, tied the femoral artery on the fore part of the thigh: so has Mr. Ramsden.

† Oil of turpentine is the best; or brandy, or tincture of myrrh. Pledgets of lint, soaked in these, are applied to the diseased surface, and frequently changed.

in

in bleeding from bones, the actual cautery is still used.

A very small artery in a bone will throw out a profusion of blood; the reason is, because the connexion of the bone does not allow the vessel to contract, nor the pressure to be applied. If in this case we can take hold of the vessel with the forceps, and bruise it; or pull it out smartly, and tear it, it will cease to bleed. If there be bleeding from the cells of bone, as in the jaws, or in the sockets of the teeth, wax kneaded into them has succeeded in stopping it*.

When a small artery (for example, the temporal artery) is only partially cut or torn across, it will continue to bleed until entirely cut across and allowed to contract.

When a cancerous tumor bleeds, our only resource is to put a piece of rough lint upon the part, and to compress it steadily for some time with the finger.

* Though it may seem to degrade the importance of my book, I will not omit the merest trifle. A gentleman reduced by mercury, had leeches applied to a bubo. One, perhaps, had opened a little cutaneous vein, which continued bleeding until he was very sick and faint. The surgeon was sent for—he tried all the apparatus of styptics and compresses, but still the bleeding continued. The scene was like the story of the rush-light. They wondered at the thing, till their alarm became greater than their wonder. An apothecary's boy getting a piece of strong adhesive plaster, (I believe, in this instance, a bit of shoemaker's wax and leather) clapt it on the orifice, and held it for a few seconds with his thumb, to the discomfiture of the surgeon, and to the patient the quiet enjoyment of his night's repose.

I have

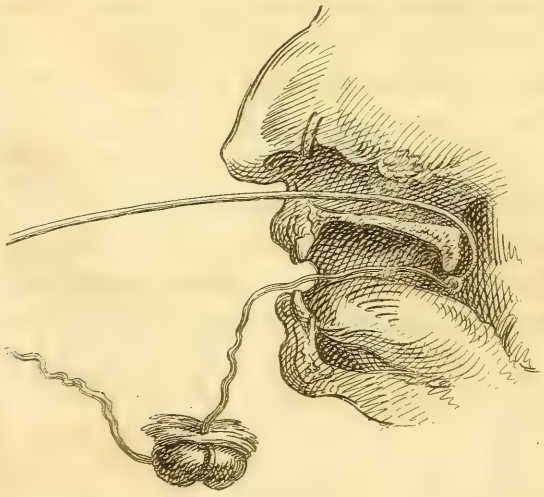
I have been greatly alarmed by the bleeding from an ulcerated callous surface,, where neither pressure, nor the sponge and lint, nor styptic, such as I could in the circumstances apply, availed. On one occasion I introduced a common sewing needle into the neighbourhood of the bleeding spot, and round it cast a thread, with the common double or surgeon's knot, and drew it so tight only as to stop the bleeding. You cannot withdraw the needle in this case without the ligature slipping, until the part has inflamed and hardened. This method may be used in bleeding from the ulceration of the glans penis, and where the preputium is destroyed. Where there is bleeding from the extremity of the penis, the preputium being entire, it may be drawn over the penis and held, or even tied, as Ruysch taught a surgeon of Amsterdam to do.

When there is bleeding from the penis, or urethra, in consequence of the use of the caustic, either the fear or the local excitement produces a kind of erection, or at least fulness, which must be subdued by pouring cold water from a tea-kettle on the glans penis.

When from some deep part there is a continued oozing of blood, which we cannot suppress, continued, perhaps, from day to day, from a fungous surface, the patient becomes weak, the countenance pale, and the whole skin cold, white, and transparent: in this situation, the health is ruined, though there is not immediate loss of life. We must then endeavour to supply the system by nourishing diet, by rich soups, and animal food, if it does not load the weakened power

power of the stomach, and even give wine, for this case differs from an active hæmorrhagy.

Hæmorrhagy from the nostrils. This bleeding is often very troublesome, and sometimes alarming. In slighter cases it is a sufficient cure to produce a chill upon the patient, by what means is of little consequence; as by throwing a little cold water upon him, or by putting his hands in cold water; but he must at the same time be drilled, and made to stand upright, and hold up his head, for the blood dropping from the nose, he naturally pokes forward and hangs his head, by which the veins in the neck are compressed, and the bleeding continues in consequence of the obstruction to the return of the blood from the head: by way of insisting upon this, I have made them gargle their throat with cold wine and water. We, at the same time, introduce by a probe or bougie, dossils of lint moistened with vinegar or spirits, into the nose, or even draw them through the back part of the nostril. Should the bleeding advance to an alarming degree, we must stop the cavities of the nose in this manner. A piece of wire (a catheter



wire for example) made with an eye to convey a double ligature, is thrust into the nostril until it appears in the throat; to facilitate which, it ought to be curved near the end, that it may turn down behind the velum; then with a pair of forceps, or a hook, or the finger, the ligature is seized and drawn into the mouth. Having prepared a piece of sponge, or a dossil of lint, such as will just plug up the posterior opening of the nostril, we tie this to the ligature, and draw it through the mouth into the back of the nose; then closing the anterior nostril by plugging it also, and tying the ends of the ligature over the plug, no blood can escape. This operation may be particularly useful after the extirpation of polypus tumours from the cavities of the nose.

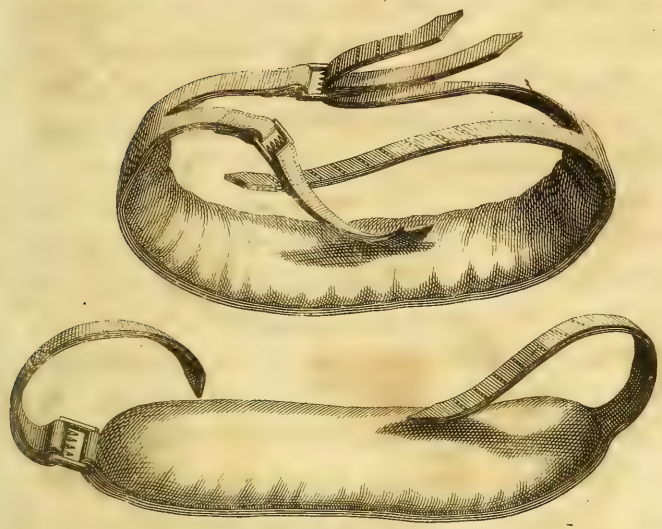
It is absolutely necessary to distinguish betwixt venous and arterial bleeding. The difference has certainly been sometimes overlooked, and operations fit only for arteries performed for the wound of a vein! The blood flows uniformly, and is of a darker colour when it proceeds from the vein, and it may be stemmed by pressure below the wound, and can always be stopped by compression in the wound itself.

Where the bleeding is *venous*—where it comes from deep parts—where it is dangerous to lay the bottom open—where not one large artery, but many lesser ones are wounded, then the sponge and graduated compress ought to be used; as in the welling out of blood from vessels lying deep under the angle of the jaw, or in the axilla.

In

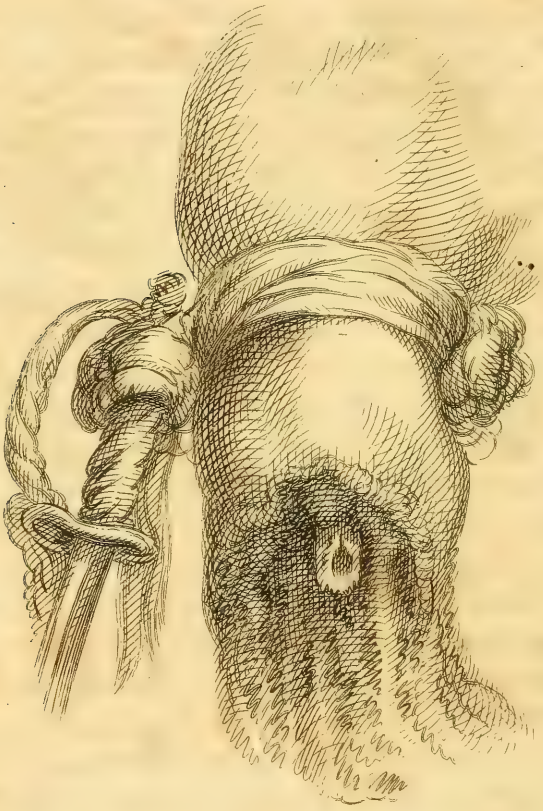
In the use of the sponge, there are some circumstances which, if attended to, may save the patient from distress. The sponge ought always to have a string attached to it, lest we be obliged to allow it to remain, when it will not be easily withdrawn from the cavity. A lesser piece should be placed immediately on the bleeding point; a larger one over it, filling the wound. The larger one may thus be taken away at an early period, while the lesser is suffered to remain. Sponges ought to be removed at the commencement of suppuration in all cases; otherwise the granulations shoot into them, and they are not afterwards to be brought away without pain and bleeding. They are dangerous when allowed to lie long in contact with the bone. I have seen caries of the ribs produced by allowing sponges to remain too long in the axilla.

In wounds received in battle, and attended with hæmorrhagy, much mischief must proceed from the application of the tourniquet. It totally deprives the limb of circulation; and, if the wounded man is for a short time neglected, the limb must irrecoverably suffer. Besides, every man does not comprehend the application of the tourniquet, when he could apply such a bandage as this, after pushing a sponge or cloth into the bleeding wound.



The slightest and the most dangerous hæmorrhagy may be stopt by introducing a dossil of lint into the wound, over this a compress and sponge, forming the graduated compress, and binding all down with these simple straps. By this means the circulation will not be totally interrupted, which it may otherways be, on account, perhaps, of a wound in a trifling artery, or a venous bleeding. But even this is only a temporary security, wherever we bind up a limb to suppress the hæmorrhagy from a considerable vessel, the roller should be applied with a considerable degree of lightness to the limb, below the part firmly compressed; and after all it must be carefully watched, or the swelling which naturally comes upon the limb

will have an effect equal to the most powerful drawing of the compressing bandage, and produce gangrene.



When the wound is open, or the limb shattered, no better tourniquet can be required than a towel, or strong pocket-handkerchief: first throwing a double knot on the middle of it, we apply the knot on the course of the main artery of the limb, and tying the ends of the handkerchief round the limb, we include the

the handle of a sword in the doubling, and twist it until the bleeding stops. From the flap of a saddle, the girth, and a small piece of stick, a very sufficient tourniquet for any purpose may be contrived.

We have to recollect the hidden danger of bleeding in gun-shot wounds, at the period of the separation of the sloughs. For it often happens that a great vessel, or only a side of it, has been deadened by the passage of the bullet, and it is opened by the separation of the slough. The period of danger is marked by the loosening of the slough, and the weeping discharge which precedes it; and this is generally between the seventh and the tenth day*. Here the judgment of the surgeon must be again exercised. Whether is it an oozing from the general surface and lesser arteries; or is it a large vessel which requires the dilatation of the wound; or is it the trunk which lies deep which is wounded; is it better to cut and tie it higher in the limb? If the surgeon be an anatomist, the performance of this last operation is always easy; if he be not, and yet have allowed himself to be thrust into a situation of responsibility, there is no measure of disgrace and confusion which can be adequate to his crime.

OF THE NEEDLE AND TENACULUM.

If an artery situated amongst loose cellular membranes bleeds, it should be tied if possible. If we

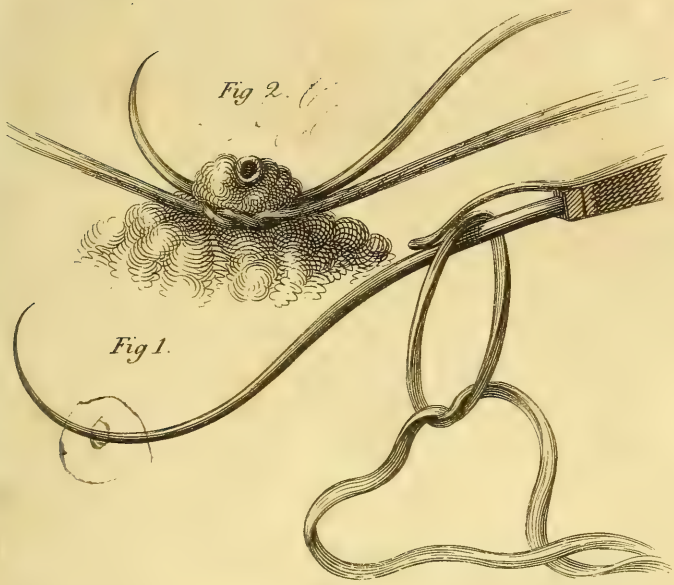
* See *Discourses on Wounds*, p. 209.

use only compression, and it do not succeed, the re-traction of the artery, and the flowing of the blood from the swelled cellular membrane, and the adhering of coagula, make at last a very confused and difficult operation. Where an artery lies against a bone, we may with more propriety trust to the compress and bandage.

In clean cuts, and especially in surgical operations, we should be able to judge of the size and force of the artery from the jet of the blood, and we should take it up at that moment if it can ever be necessary at all. By the pressure of the finger, it is made to bury itself among the fat and cellular membrane, or by allowing it to bleed, it exhausts itself. But in both these cases it may be stopped, only during the faintness, cold, and dread of the patient; and though the vessel may not be discoverable again before the flaps are laid down, yet upon the revival of the patient, and when he is put into bed, it breaks out again, and requires the whole dressing of the wound to be undone.

The tenaculum is an instrument in common use for drawing out the artery in open wounds, so as to enable the surgeon fairly to tie its mouth. I have given what I conceive to be the necessary curve to it, making the curve a little more acute towards the point, to enable the surgeon to catch the mouth of the artery more easily*.

* For country practice, or the use of the army surgeon, where there may be occasion to tie an artery without the aid of



The tenaculum is put into the surgeon's hand during an operation, with the ligature hanging on it thus (fig. 1.) He catches the artery, and pulls it out, and the ligature is brought down towards the vessel by the assistant, and tied (as in fig. 2.) If the artery is large, or lies deep, then it is transfixed, and the curve of the instrument directs the ligature into the bottom of the wound. In drawing the ligature, the assistant should, with his fore-fingers

of an intelligent assistant, the curve of the tenaculum should be a full half-circle, and the handle made heavy, that it may hang so as to draw out the artery whilst the surgeon ties it.

placed

placed on the ligature near the knot, push it down into the wound, at the same time that he draws.

Large ligatures slip from the end of the vessels, upon the first wasting of the cellular membrane. Small ligatures are more apt to be fixed amongst the granulations. A ligature which has not been drawn sufficiently tight, sometimes remains a long time, because it does not entirely deaden the part, and a bud of granulation grows up, around the neck of which the ligature hangs loose. If a nerve be included in the ligature, great pain is felt at the time of drawing it; there are twitches in the wound during the cure; and the ligature takes a tedious time to loosen. It has happened that the nerve thus included in a ligature has enlarged into a bulbous end; and that, like a button in the noose of the ligature, it has detained it for months.

To cut out a ligature which is thus remaining and keeping the wound unhealthy, you must soak and separate the two ends of the ligature down to the knot; then move the blades of the scissars along one of the ends until you are close upon the knot; and, after cutting it, by pulling gently on the remaining end, the knot will slip.

The use of the needle any where else than on the face of a stump, requires an accurate knowledge of anatomy. The operator may otherwise transfix a large artery when he is taking up a small one, or include a nerve, so as to produce a contraction of the limb.

When a great artery is wounded by a penetrating or oblique wound, the integuments adhere by compression,

pression, and there slowly arises a beating tumour over the wound of the artery, under the fascia and skin, or even under the muscles. This sometimes happens where the tourniquet cannot be applied; and in that case the surgeon is to open the tumour with a small wound, and introducing his finger (before the blood escapes), he has to endeavour to feel the beating artery. Securing, by the pressure of the point of his finger, the bleeding orifice, an assistant lays the whole tumour open, and clears the cavity of coagula: the surgeon then taking the needle, passes it round the vessel, and the assistant ties it. The needle is sometimes used in the face of a stump, or in an open wound, generally when the mouth of the artery cannot be distinctly seen. It either includes much of the muscular flesh, or the cellular membrane, in the same knot with the mouth of the artery, or it draws the flesh in over the bleeding orifice. The operation is done in this way:

(1.) Is the bleeding orifice. I introduce the curved needle at (2), and bring it out at (3), passing it through the cellular membrane. I introduce it again at (4), on the other side of the vessel, and bring it out at (5), some distance from (2): then, by casting a knot on the ends of the ligature, I am enabled to draw the cellular membrane like the mouth of a purse, and to include the bleeding artery.

Either after an operation, or in a wound where there have been many vessels tied, we should assort our ligatures; and if we have not twisted and tied the extremities of each ligature together when they were drawn, we should do it now, for the convenience of dressing. When the parts are brought together, the threads should be left hanging, if possible, in the depending part of the wound.

If we are anxious to procure adhesion, and there be so many and large ligatures, that if they were allowed to hang from the wound they would necessarily obstruct the union; then, by separating the threads of which the ligature is composed, we may cut short the greater part of it, so that only one strong thread remains hanging from the lips of the wound, which will yet be sufficient to pull away the ligature in due time.

OF THE USE OF THE NEEDLE IN FLESH-WOUNDS.

Under this head I have only to say, that the needle and ligature is by many surgeons used on every

every trifling occasion, and quite needlessly. In a wound that might have been cured with great ease, by an adhesive strap, or the uniting bandage, I have seen the surgeon very alert with his needle. This is quite wrong, and exposes the surgeon to a very unpleasant imputation: it is making a surgical case* out of nothing.

If there be a cut in a fleshy part of a limb, still there is no necessity for bringing it together by ligatures. If the cut is *with* the fibre of the muscle, the wound will not gape; if it be made across the muscular fibre, it is best managed by bringing the limb into a position of ease, and relaxing the muscle.

Parts on which you can apply the compress and bandage, as against flat bones, seldom require the needle and ligature.

In loose and moveable parts, as in the cheek and lips, ligatures or the twisted suture are absolutely required. In the belly, too, the suture is absolutely necessary. But in the scalp, if possible (and I believe it is always possible), the needle is to be avoided; the uniting bandage, and soft elastic compress, answering every purpose, when the hair growing from the scalp has made it difficult to bring the wound together by the adhesive straps.

After operations with a loss of skin, much advantage may be gained by one or two strong ligatures. But let them be well supported by adhesive straps. By this means, what would probably degenerate into an extensive suppurating sore, may be made to ad-

is it not a surgical case once a surgeon is called
for Confounded Blockhead

here by the first intention; or at least the open surface may be much diminished.

When the needle and ligature is used to draw the lips of wounds together, we make the interrupted suture. If we do not support the integuments from cutting upon the ligature, by adhesive straps in the intervals, we must do it by laying compresses on the sides of the wound, and over these applying the roller or bandage.

It is by this means that we avoid the filling of the deep part of the wound with blood. Notwithstanding the arguments for the vitality of the blood (and these I am far from contradicting), the fact is, that by negligently allowing the blood to lodge in the wound, we shall afterwards have suppuration.

In wounds, as in ulcers, it will be often essentially necessary that we support them by an elastic roller. But much pressure irritates; and I have seen it when very great, as in the attempt to suppress the hæmorrhagy, produce gangrene in the wound.

When we wish the lips of the wound to heal, so that there shall be no unsightly scar or contraction, all depends upon the neatness with which the edges are brought together; and we must be careful that they be not turned inward. After the operation, we must keep the parts very dry, and promote the formation of a scab by the oozing of the secretion. If there is a little fretting, we may pick and lift a part of the scab, to allow the collected matter to flow, and squeezing the wound gently, evacuate it, rather than by this accident lose all our hopes of union.

When

When a fretting erysipelatous inflammation is on the lips of the wound, by cutting the ligatures in time, and removing their irritation, still however supporting the parts, we may save the wound from bursting entirely up. When this fails, suppuration must be promoted by fomentation and poultices, and the parts brought together again, after kindly suppuration is established.

In the hopes of procuring adhesion, and indeed in the treatment of all wounds, we ought not to allow the patient to lie much in bed, or to live in a confined room, but move him about, if the circumstances of the case will allow. Free air, simple diet, and a correct state of the bowels, are absolutely indispensible.

CHAPTER I.

Of the Operation of Bleeding in the Arm—Of the bad Consequences which may follow—Of the Operation for Aneurism in the Arm—Of the Operation for Aneurism in the Ham.

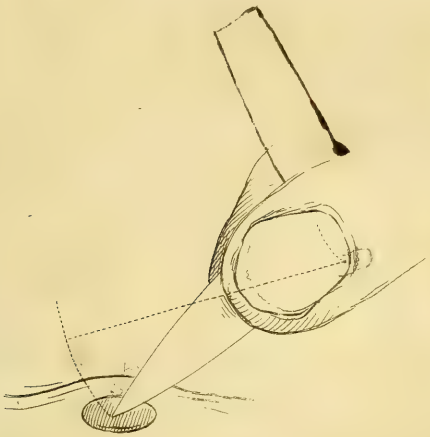
OF BLEEDING IN THE VEIN OF THE ARM.

The ribbon or band being put about the arm twice, and drawn with a double running knot, we draw the bandage as tight as possible, without affecting the pulse, If the patient be timid and faint, he may be laid in a horizontal posture.

In choosing the vein, we take that which is most prominent, and least apt to roll under the finger. In feeling it, we move the point of the fingers lightly across it. The choice lies in general betwixt the *median basilic* and the *median cephalic* vein; and although the humeral artery lies under the first, we generally prefer it.

As to the instrument, I think that in general the lancet is made too much spear-pointed, as it is called; and that the shoulders of it should be broad. But the form of the puncture depends less upon the lancet

lancet than on the motion of the fingers. It is not intended to *prick* the vein, but to *open* it; and at the same time to make such an incision in the skin as to make the blood flow freely.



The lancet enters the integuments at A, fig. 1. and pierces the vein B. The motion of the lancet and fingers revolves on the point D, so as to carry the lancet a little forward, and bring the point out in the line C. If a timid boy, after pricking the vein and seeing the blood, withdraws the lancet, an oblique opening, as in fig. 2. is made, which is the worst that can happen in so trifling a matter. The arm is to be turned so as to present the orifice to the bason for receiving the blood; and then the operator, grasping the arm, places his thumb a little lower on the vein than where he intends to puncture, so as to distend and fix the vein. This should be

be done in such a manner as to avoid changing the natural relation of the skin to the vein. This would occasion what happens when we turn the arm round to the bason, after puncturing the vein, by which the orifice of the skin is shifted from a due correspondence with that of the vein. The blood begins to trickle, instead of flowing in a stream; and immediately after the operation, there is around the orifice blackness and tumour, from ecchymosis *.

As soon as the lancet has entered the vein, the thumb of the left hand is raised from the vein. When the blood stops too soon, you make the patient exert the muscles of the fore-arm, by clenching the hand; while you chafe or rub the fore-arm gently upwards with a warm hand; that is, you force the blood from the deeper veins, while, by relaxing the skin, you give greater freedom to the superficial course of the blood. If the patient is faint, you lay him horizontally.

When you wish to stop the blood, you put the thumb of the left hand firmly on the vein, a little below the orifice, and loosen the bandage.

Generally when the bandage is taken from the arm, the bleeding stops, and a very slight compression secures it. We put on a small compress of lint, as we would apply a piece of adhesive plaster. Putting it down upon one edge, we stretch the

* Sometimes when there is a disease in which we foresee frequent occasions for bleeding, we strike the vein high in the arm, leaving good space for future punctures below.

wound

wound longitudinally with the finger and thumb of the other hand, bringing the lips by that means accurately together, so as to prevent the fleecy lint from entering betwixt the lips of the puncture. Over this is placed a larger compress, and then a roller, which is made to encircle the arm above and below the elbow-joint, in form of the figure of 8 *.

BAD

---

* OF BLEEDING IN THE NECK.

It may be necessary to perform this operation instantaneously, and it requires no apparatus; nothing but the lancet and a small bason. The patient is laid with the head low. If it be a child on whom you have to operate, you lay the child over your knee, and pressing the fingers and thumb on the lower part of the neck, on each side of the trachea, so as to compress the jugular vein, you strike the lancet into the external jugular vein, as it crosses the mastoid muscle. The pressure of the edge of the bason below the orifice will be sufficient to produce a flow of blood.

OF BLEEDING IN THE FOOT.

The ligature is put a little above the ankle, or below the knee, and the feet put into warm water. The saphena vein on the inner ankle is that usually struck. If the blood does not flow freely, the foot is again put into the warm water, to bleed there; and we have to judge of the quantity drawn by the stream of blood in the water, and the deepness of the colour of the water.

OF BLEEDING IN THE TEMPORAL ARTERY.

The artery is struck before the ear, and at such a distance above the jugum, that it may be fairly exposed to compression. It may be struck at once, opening the integu-

ments

BAD CONSEQUENCES WHICH MAY FOLLOW BLEEDING IN THE ARM.

Ecchymosis.—When the blood does not readily stop, and when the pressure has not been sufficient to compress the vein; when soon after the operation, the patient has strongly exerted himself; when he complains of pain and stiffness, and upon taking off the bandage the orifice and the skin for some extent round it is black with blood extravasated under the skin; the distended vein has burst forth, and poured the blood amongst the cellular membrane; —the part is to be embrocated with vinegar, spirits, camphorated spirits, &c. in the hope of preventing suppuration. Perhaps on the following day, instead of finding the puncture healed up, and free from inflammation, the lips of the orifice are turned out, and are hard, fretted, and inflamed.

Bathe the part with warm water, and dress lightly with soft, dry lint. If the part still remains fretted, a little mild ointment will be necessary. If the inflammation extends with an erysipelatous character, use a more general fomentation. If the sore becomes very irritable, a cold poultice of a

---

ments freely over it; or a small incision may be made with the lancet over it, and then the artery punctured. The common roller and compress will stop it. It has, however, been found necessary to cut it across before it stopped.

weak

weak solution of lead, with or without opium, will frequently relieve it.

INFLAMMATION OF THE ARM, UNDER THE FASCIA.

I SAY inflammation of the arm, because I see no proof of this effect which I am going to describe proceeding from inflammation of the fascia.

To such an inflammation of the orifice as I have noticed in the last paragraph, there succeeds great pain and difficulty of moving the arm, with a sense of tightness and binding, and pain on pressure.

These symptoms I conceive to proceed from the inflammation spreading in the cellular membrane, and passing down amongst the muscles and under the fascia. The fascia acts as a bandage; and from the swelling of the parts beneath, it binds the arm, but is not itself inflamed and contracted *. Here the fomentation and poultice must be used.

Should the disease be suffered to continue, the elbow-joint will be bent, and the arm contracted, and the fingers drawn up.

In this case the fascia must be slit up to relieve the swelling beneath. It may be rather a nice if not a dangerous operation, to cut the fascia at the point, where the expansion goes off from the round tendon of the biceps; and it will be better to begin an incision nearer the inner condyle of the humerus,

* See some very characteristic cases, by Mr. Abernethy, *Surgical and Physiological Essays, Part II.* See also *Medical Communications, Vol. II.*

and to continue it some inches down the arm. When matter forms, it will in general point where the fascia is weakest. It must be freely and early laid open. If this inflammation is neglected in the beginning, hardness and permanent thickening of the fascia and cellular membrane, with contraction of the arm, are apt to follow.

Either arising from these suppurations following bleeding, or from accidental wounds, there will come a stiffness upon the elbow-joint, a tension upon the fore-part of the joint, which checks the motions of the fore-arm, even after the inflammation has ceased *.

OF INFLAMMATION OF THE VEIN.

Another accident which follows bleeding, is an inflammation of the vein itself. This I presume will also be preceded by hardness, and inflammation of the wound, and gaping of the orifice; and inflammation, hardness and pain, will be found in the course of the vein, which does not become turgid

* To remedy this, friction is made with mercurial ointment and camphor; or a warm aromatic plaster in the day time, with a poultice and camphor in the night. The arm must be extended by a splint upon the fore part of the joint, padded at first with a compress to fill up the angle made by the flexion, which should be gradually diminished until the arm can be fully distended. From time to time the bandage must be undone, and the patient made to toss and move the arm.

when

when a ligature is put about the arm. There follow this, abscesses in the co rse of the vein. The danger is conceived to arise from the matter formed within the vein being carried into the circulation, or from the inflammation spreading to the heart, along the course of the veins. Adhesion would stop such inflammation, and accordingly we have it recommended on the first surgical authority, that with the means of subduing inflammation, we should be careful to compress the veins above the inflamed part.

INFLAMMATION OF THE ABSORBENTS.

An occurrence after bleeding, more common than the last, is inflammation of the lymphatic vessels. It is preceded by the same irritable, hard, inflamed orifice, as in the inflammation of the vein. There follows sometimes general swelling and inflammation of the arm; sometimes only an inflamed cord is felt running up in the course of the lymphatics; sometimes the inflammation runs retrograde, in a direction down the arm. The glands in the axilla are swelled and painful, and tumours and abscesses have formed in the course of the absorbent.

This affection of the lymphatics or absorbents, is not the consequence of injuries received in the lymphatic from the point of the lancet, for several vessels are sometimes inflamed at once. They inflame and sympathise with the peculiar irritable state of the inflammation in the wound. The affec-

tion is attended with considerable fever, and general irritability.

The treatment is similar to that followed in common inflammation.

OF THE INJURY OF THE NERVE.

Where the nerve is wounded, the patient sometimes screams when the lancet enters; and, in the only instance which I have known from the patient's description, though he had no apprehensions, and was suspecting nothing; yet in the very instant of striking the lancet, he was quite overcome—he was seized with inexpressible confusion and alarm, with trembling, palpitation, and breathlessness. These feelings came upon him before he had time to think what might have happened. In some instances, a shooting pain has struck up the arm to the head; and on the following day a thrilling sensation has been felt towards the fingers.

In general it is some little time (perhaps three days) after the operation before any convulsive motions in the muscles of the arm side of the neck and back are felt. The convulsive attacks and the clenching of the jaws increase in violence, and seem to bear no relation to the state of inflammation in the wound. They are even greatly aggravated after the healing of the wound. Their accession is chiefly when the patient is exhausted by watching, and when just falling asleep he is suddenly roused and stiffened with convulsion. It is these harrassing attacks

attacks when he is dropping asleep, and the short disturbed slumbers, with frightful dreams, which exhaust and subdue the patient's strength and spirits.

The disease, as I conceive it, soon ceases to be a local affection. Of this, at least, we are certain, that if the patient receives the slightest scratch or abrasion of the skin, the disease, though previously much abated, recurs with the utmost violence.

In the violence of the paroxysms, large doses of opium, with cold air, or the dashing of cold water will, I believe, give relief. As to the wound, I should do nothing; yet I would prefer to incisions the burning of it with caustic. The general health and strength must be supported by generous diet and wine. But on this subject I speak with diffidence, because in tetanus from other causes I have often seen those fail, on whose abilities I place the greatest reliance.

If the nerve is to be cut, we recur to anatomy: mark the place of the orifice, calculate upon the distribution of the nerves, and, placing a tourniquet on the arm, dissect and cut the nerve. It will, however, at once occur to the surgeon, that a teazing operation seeking out nerves in this irritable state of the patient, may be attended with an aggravation of the disease.

CHAPTER II.

OF ANEURISM.

Aneurism is a pulsating tumor, formed of arterial blood. It is colourless, and little painful on pressure. The blood may be contained in the dilated artery, in which case it has been called the true aneurism; or it may be contained in the condensed cellular membrane, or under the fascia. In this case it has been called a *false aneurism.* Though out of the coats of the artery, the blood may be so contained by the cellular membrane as to form a *circumscribed* tumor, or it may only be retained by the general fascia, and of course be more generally *diffused:* and thus we have the distinction of the true, the false, the circumscribed, and the diffused aneurism. I believe there is no distinction of aneurism arising from the puncture of the external coats of the artery only.

When the tumor of an aneurism is first formed, the blood being fluid, it is compressible, and its pulsation is powerful; but when the blood coagulates, and is formed into a firm coat, the tumor does not vanish on pressure.

Aneurism follows from obliquely penetrating wounds, which have pricked the artery—from a fractured bone tearing the artery—from a twist or injury of the artery when in a diseased state—from a scale

of

of ossification in the artery, tearing or causing an ulceration of its coats—from the artery losing its elasticity, and gradually yielding to the impetus of the blood.

The most distinguishing character of an aneurism is its pulsation; but when the blood has coagulated in any considerable quantity within it, the pulsation often becomes very obscure. On the other hand, if a tumor lies in contact with a large artery, or includes a considerable artery in its substance, it receives the pulsation from the artery, and may be mistaken for an aneurism.

The true and the false aneurism is not to be distinguished by the greater or lesser pulsation of either, or by the compressibility of the one being greater than the other.

The true aneurism forms at that part of the artery where the coats are most exposed to the impetus of the blood, as in the arch of the aorta, where the common carotid branches, and where the artery passes the great joints, as in the groin, or behind the knee. In the two latter places, the aneurism from disease of the coats is peculiarly apt to form; not that the coats of the arteries are more diseased here, but that the general arterial system being diseased by the bending of the limbs, the artery at these flexures becomes directly exposed to the course of the blood.

While I do not deny but that the arteries in the extremities, like the aorta, sometimes suffers the nature of an aneurismal tumor by mere distension or enlargement, yet more generally that which we call a true aneurism appears, on dissection, to be of the nature of a diffused aneurism; viz. the artery has

given way entirely on one side, and what forms the walls of the tumor, is merely the condensed cellular membrane. Further, the surrounding cellular membrane and the fascia so embrace the bleeding orifice of the artery, that strictly speaking, there is no such thing as a diffused aneurism. The condensed membrane and fascia forming a sac more or less regular*.

OF THE WOUND OF THE ARTERY, IN BLEEDING IN THE ARM, AND OF THE OPERATION FOR ANEURISM.

The blood flowing per saltum, has often made the face of the young surgeon pale with affright, but without reason; for the blood will sometimes flow from the vein in jets, owing to the general fulness of the arm, or the pulsation of the artery immediately under the vein.

The patient who applies to you with an aneurismal tumor, will, perhaps, say that he thought the lancet went very deep, and that the bleeding was unusually profuse, and difficult to stop. Soon after the operation, a small tumor forms on the part; at first soft, regular, and with an evident pulsation. In this first stage we may compress it, when the blood probably will return into the wounded vessel; or it may also pass into the deeper recesses, by the insterstices of the muscles. At all events, this receding of the blood I have seen.

* Aneurism by Anastamosis.—See tumours.

In

In a few weeks, or we had better say when the tumor is increased, the character of the disease is considerably changed. A tumor, not very prominent or regular, occupies the whole bend of the arm having an obscure deep pulsation when we put the whole hand upon it. The arm is bent in consequence of the binding of the fascia, and the fingers are crooked. Now a firm coagulum is formed in the sac, and the fascia is stuffed and distended to the utmost, and we are no longer capable of compressing and emptying it by gentle means. Bolder and more cruel attempts (and such I have seen made from ignorance and obstinacy, twin brothers) only diffuse the blood wider, by bursting up the cellular membrane, and the deep connexions of the fascia.

In the end, by the continued pulsation of the artery, the blood poured out is so beaten together and impacted, that the pulsation of the tumor is scarcely perceptible.

The complaint which brings the patient to the surgeon, is not the tumor and pulsation; it is the lameness, the coldness, numbness, and diffused pain of the arm, proceeding from the compression of the artery, in consequence of the aneurismal tumor, and the distension of the fascia.

Though I know no instance of it, there is a possibility of a spontaneous cure. For when the tumor has distended to the last degree, if the accumulated coagulum should press so strongly on the artery as to interrupt the pulse which was free in the beginning of the disease; the collateral branches may become enlarged, and the current of blood may altogether leave

leave the trunk of the artery. This is precisely the effect which is to be accomplished by the surgical operation. And immediately after the operation, I have felt the pulsation behind the elbow, and feebly in the wrist.

OPERATION.

The instruments necessary are only the common pocket case, scalpel, directory, probe-pointed bistory, a blunt hook, and aneurismal needle, and the tourniquet.

I.

The tourniquet is applied by the assistant, who takes the management of it. The arm is held down upon a pillow. You make the incision, beginning by the side of the biceps muscle, over the most prominent part of the tumor, longitudinally in respect to the arm, and so as to reach at both ends a full inch beyond the base of the tumor.

II.

The integuments retracting, there rises into view a firm dark-blue tumor, formed of the impacted blood, covered by the shining fibres of the fascia.

The fascia, far from being stretched so as to lose its character, has become stronger, and more tendinous. This brings us to consider the anatomy of such a tumor. We have to recollect the difference betwixt the

the opening of a bloody tumor, and a deliberate and orderly dissection. The simple, though accurate ideas we have received in dissection, are apt to be confounded in operation. We think we are acquainted with the situation of the arteries, veins, and nerves; but we find nothing which we have ever seen before.

III.

Puncturing the fascia, we slit it up in all the length of the tumor, either introducing the finger or the directory before the bistory.

We have here to recollect, however, that in some cases the artery has been entirely transfixed by an adventurous bleeder; and that, in consequence of this, the blood has been accumulated behind the artery, and the artery presented immediately under the fascia.

When the fascia is slit open, you can recognise nothing with which you are previously acquainted. Instead of the artery and accompanying vein and nerve, there is an irregular dark-coloured cavity; and, from the bottom of this, on unscrewing the tourniquet, you see a jet of blood.

With the finger, warm water and sponge, the coagula are to be cleared away. We are now directed in general to turn the tourniquet, and allow the vessel to bleed; but much may be done previous to this. We put down the finger upon the spot where we see or conceive that the puncture of the artery has been made. And now the tourniquet being

being turned, we see that this is the point, by being enabled to command the bleeding, and by the jet which is thrown out when the point of the finger is lifted.

When the fascia is cut, the crooked arm will be allowed to fall flat on the cushion; but at this part of the operation we must bend it again a little, to allow us to separate easily the artery and the nerve. We must not dive with the needle above and below the bleeding orifice, else we shall include the radial nerve, as I have seen done; but separating slightly the artery from its bed, not cutting it up extensively, lest we touch some enlarged collateral branch: two ligatures are to be laid under it, the one above, and the other below the orifice: tying the upper one, we have the comfort of seeing the blood return from below, then we tie the lower ligature.

Bringing the integuments together, we dress the wound lightly, and keep the tourniquet upon the arm, as in amputation.

The arm is laid upon a pillow, a piece of flannel over it, and a bottle of warm water under the palm of the hand. The arm and hand are at first benumbed and cold, but soon regain their natural heat. From the sixth to the tenth day, the ligatures may be expected to come away: they ought neither to be tugged with violence nor cut short*.

* The operation as described in the Exposè de la Practique d'Desault, par. X. Bichat. was very ill performed, and ought I conceive to influence us in no degree.

THE

THE OPERATION FOR POPLITEAL ANEURISM.

In the course of the artery through the limbs, that part which is behind the knee joint is the most exposed to disease; or rather, we should say, to the most frequent consequence of the diseased state of the coats, aneurism. This disease is called the popliteal aneurism; and is a frequent occasion of operation.

This is called a true aneurism; but I believe that it is oftener a bursting of the proper coats of the artery, than a dilatation. The artery generally gives way suddenly, with acute pain and lameness, in consequence of sudden exertions; or after a long walk; or in carrying a heavy burden. But, though the proper coats have given way, the common coat, the cellular membrane, and the uniform compression of the surrounding parts, and the binding of the fascia, will often prevent any rapid increase of the aneurism. Yet sometimes, in the course of a very few days, there is total lameness, great swelling around the joint, and œdema of the leg and foot.

In most cases the swelling is uniform, the proper aneurismal tumor little prominent; the pulsation is, however, distinct, until the œdema spreads very much around the joint. We do not operate in the place of the tumor, but in the fore part of the thigh, where the artery lies more superficial. The operation in the ham was given up, from the many bad consequences of deep incisions to get at the artery

among parts already diseased; the consequences of which, were extensive sores and abscess by the side of the aneurismal tumor, ulceration of the artery, and repeated hæmorrhagy; and, in some cases, the triceps was cut across in pursuing the bleeding orifice of the artery.

For the advantages of the present method, we are indebted to Mr. Hunter. Mr. Home persevered in the views of Mr. Hunter, and established the operation. It is performed with some variety in the manner of securing the artery, by Mr. Lynn, Mr. Abernethy, and Mr. Cowper.

As long as the tumor behind the joint is small, and the general swelling and tumefaction of the knee, leg, and foot, moderate, it may be proper to delay the operation: for during this delay, the collateral branches are enlarging. But when the tumor in the joint is large and firm, the ham-strings distended, and the general swelling increasing, delay produces the danger of suppuration in the ham after the operation.

The tourniquet is put about the limb, but not screwed so as to obstruct the artery. The instruments necessary, are a scalpel, a blunt hook, a probe, and a flat silver needle.

I.

PLACE OF THE INCISION.

The incision is made in the tract of the outer edge of the sartorius muscle, beginning about three hand-breadths

hand-breadths from the superior spinous process of the os ilium, and being carried down about five inches; but the length of the incision must vary with the depth of the integuments.

II.

Having cut through the fat, and exposed the fibres of the sartorius muscle, you turn aside the outer edge of this muscle, and now you find a strong fascia under it. This fascia covers the artery.

N. B. If the artery is to be tied at the point 10, *plate IX. engravings of the arteries*, it will be better to cut on the outer edge of the sartorius muscle, and to fold the muscle aside, with the integuments of the inner edge of the incision; but if it is to be tied higher, it is better to make the incision upon the inside of the muscle, and turn it outward, to find the femoral artery.

A surgeon, who is no anatomist, will find himself a little difficulted in this stage of the operation. I have seen such a man cut, unscrew the tourniquet, cut again, unscrew the tourniquet, and look confused, stupid, and irresolute. I have seen a very intelligent surgeon take the aponeurosis, covering the artery for the dilated artery itself. I have seen another look first on one side of the sartorius muscle, then on the other for the artery, enlarge his incision, cut the collateral arteries, and, as it were, contrive to perform in a bungling manner a very simple matter.

III.

III.

We cut into the fascia * and slit it up, and then seize the pulsating artery with the fingers, and lift it from its bed of cellular membrane; and to separate it from the vein and nerve, use only the handle of the knife, or end of the probe. We now pass a probe under it, if we intend to tie it twice and cut it between, as I would recommend should be done: but if we mean simply to tie the artery, as proposed by Mr. Hunter, we have only to pass the aneurism needle under it and to tie it once, and close the wound, leaving the ligature hanging out †.

* The fascia must be known to the surgeon in dissection: it is that which spreads from the insertion of the *triceps*, and the origin of the *vastus internus*.

† Mr. Lynn, of the Westminster hospital, has performed the operation for aneurism in the fore part of the thigh, eleven times in Mr. Hunter's manner, and only one of the patients he lost from hæmorrhagy, owing to the bursting of the artery. He argues thus: "when I have dissected the arteries of the thigh in the dead body, I find that on bending the thigh, the arteries hang loose, and are too long for the thigh, and do not keep their places; therefore, I conceive that after the operation for aneurism, I am enabled by managing the position of the thigh alone, keeping it easily relaxed, to give full freedom for the artery to contract without cutting it across."

IV.

IV.

If the artery is to be cut, and this I recommend, we separate it somewhat more from its bed of cellular membrane; as much, perhaps, as will let the finger under the artery: then pass under it the aneurismal needle with a double thread; the needle being cut off, two ligatures are formed. We tie the one as high as possible upon the artery, and the other as low. We cut the artery betwixt them.

In Mr. Astley Cooper's observation, the ligature was thrown from the end of the artery; by the force of the arterial pulsation. Mr. Henry Cline, therefore, has proposed to put the needle and thread through the artery, after tying the ligature, and then to tie it a second time.

After the operation a few hours, the patient's pulse rises. The lower part of the thigh and knee has to me appeared to acquire an unusual degree of heat. The leg and foot is cold and benumbed.

CONSEQUENCES OF THE OPERATION.

The most unfavourable circumstance during the operation, is to find the artery crisp and diseased: we have then to dread the ulceration of the artery, before it shall be closed above the ligature. This is the most common cause of failure after this operation. As far as I have seen, the danger of this is

during the period from the tenth to the fifteenth day after the operation. To guard against immediate death from this, the tourniquet must be kept on the limb.

Next to the hæmorrhagy, the danger of gangrene presents itself to the surgeon's mind. I do not think that the cause of it is generally understood; at least in the only two instances which I have seen, the cause was one which I do not recollect to have been mentioned, viz. the inflammation and distention consequent upon the suppuration of the tumour behind the knee. Where the tumour has been small, and the œdema slight, I have no fear for the re-establishment of the circulation of the limb; but when the circulation seems perfectly established a few days after the operation, and there comes great distension about the knee, and the tumour in the ham becomes large and firm, when the œdema in the leg and foot does not go down, and there is pricking pain shooting to the toes, with a dark colour of the skin, I conceive that there is danger of the vesications which precede gangrene, arising on the toes. This gangrene, I have seen proceed in its course uniformly for several days, and cease upon the bursting of the tumor, and the discharge of the blood of the aneurism, and a great quantity of offensive matter from behind the joint, and from under the bellies of the gastrocnemii. The tension, as I conceive, occasioned by the inflammation and swelling of the sac, had stifled and suppressed the free action of the collateral vessels, and the return of the blood

blood by the veins, so as to produce gangrene in the extreme parts. Should such a case present to me, I should have no hesitation in puncturing the tumor of the aneurism. To puncture it in this stage, after inflammation in the sac, I should imagine would be attended with no hæmorrhagy, but only with the evacuation of such grumous blood as flows with the matter when it bursts spontaneously. At all events it should be so punctured that the opening might be closed again in such a way as to avoid accelerating the wide extending suppuration which sometimes follows the dissolution of the blood in the sac.

When gangrene has taken place, (from whatever cause, and here as in others) the system must be supported. The countenance and pulse will sufficiently indicate the necessity of this. The foot must be fomented. When this danger is warded off, the extensive suppuration, and the destruction of the bones, both from the matter and from their lying pressed to the bed by the weight of the limb, will endanger the patient's life. In this state we must still guard the general health, and wait for an opportunity of amputating.

OF TYING THE EXTERNAL ILIAC ARTERY IN THE FEMORAL ANEURISM.

The natural or spontaneous aneurism I have already observed takes place most commonly where the artery is passing a joint, because there, in the

bending of the limb, the artery being also bent, it receives the full impulse of the blood, and the coats of the artery being already diseased they are here more subject to be further injured by the motions of the thigh.

A small pulsating tumour is perceived a little below the groin. By successive stages, it bursts up the connexions of the fascia, and from the perpendicular lamina of the fascia restraining the blood, the tumour is often divided into parts, in the last formed of which the pulsation is strongest, while from the coagulation of the blood in the others they are firmer, and have less pulsation.

I have thought that tying the femoral artery below the tumour might divert the stream of blood from it, allow the blood to coagulate, and make a cure as in the natural process of obliteration of an aneurism. I find that this has been attempted in France, with very little success. There is no space betwixt the tumour and the ligament of the thigh; for indeed that ligament often circumscribes the tumour above, and consequently the femoral artery cannot be tied there.

Mr. Abernethy has proposed, and has three times performed an operation for the cure of this aneurism. In the first instance the artery ulcerated on the fifth day after the operation, and small quantities of blood was occasionally discharged from it till the eighth, when the patient died. The case is related in the third part of his Surgical and Physiological Observations, page 155. The second is narrated in the first part of his Surgical Observations; and the

third patient I have just seen, thirty hours after the operation. The tumour is lessened very much, the limb warm and perspiring. I regret that I cannot give the result. There is a case pending in the Birmingham hospital also.

Mr. Abernethy operates in this manner: pressing the fascia of the external oblique muscle, he feels the beating artery; or if that is obscure, he ascertains the precise place of the artery by the relations of the superior and inferior spinous process of the ilium, and the crest of the os pubis. He then makes an incision, about three inches in length, through the integuments of the abdomen, in the direction of the external iliac artery, beginning just above Poupart's ligament. His second incision goes through the aponeurosis of the external oblique muscle; he then insinuates his finger between the internal oblique and transversalis muscles and the peritoneum, and divides them upwards to the extent of an inch and a half. The knife is now laid aside, and the peritoneum is pushed up from the vessels of the thigh and psoas muscle,

The artery is next felt for, and now separated from the vein, on the inside, and the anterior crural nerve, on the outside of the artery. He passes a double ligature under the artery, and he is particularly careful to have it of so great a thickness that it cannot cut the artery in drawing it very firmly. Cutting the needle from the ligature, the one portion of the ligature is pushed as high upon the artery as possible; the other is brought low, and both ligatures are tied,

and

and then the artery is cut in the middle, and the parts brought together. Mr. Abernethy is particularly anxious to avoid the vein, and not to include it in the ligature, as he rightly conceives, when the force of the arteries of the limb is so much diminished as it must be after the operation for aneurism, an obstruction to the return of the blood by the vein would probably produce gangrene.

What seems to have destroyed Mr. Abernethy's second patient, was the putrefaction of the blood in the aneurism, after the ligature had come away, and the circulation of the leg was completely restored. If therefore he found that in the present case the blood of the aneurism were to open a communication with the wound, certain that by this communication with the air, that it would putrify, and become a source of mortal irritation to the system, he will then open the tumour, and wash the blood from it entirely.

I confess that my fears are still for the ulceration of the artery.

OF ANEURISMAL VARIX.

This is a peculiar kind of aneurism, and happens only after bleeding in the median basilic vein. It is a communication formed betwixt the humeral artery and the median basilic vein; in consequence of which

which, the blood being carried into the vein with the same force which impels the blood in the artery, it dilates the veins.

This communication is formed by the lancet, transfixing the vein and fascia, and puncturing the artery. As the blood in this case will naturally flow profusely, and be difficult to stop, the surgeon probably applies his compress very tight. This produces a firm adhesion of the fascia to the artery, and of the vein to the fascia, whilst the puncture made by the lancet remains open betwixt the artery and vein.

The symptoms and character of the aneurismal varix, are these: there arises over the artery, a few weeks after the accident, a flat swelling of the vein, with the mark of the lancet in the middle of it. On placing the finger upon this tumor, a faint pulsation or vibratory motion is felt. There is a noise, or at least a peculiar feeling, which conveys that idea, 'between thrilling and whizzing.' The tumor extends from the median-basilic to the other veins; but it is chiefly of the median-basilic, median-cephalic, basilic and cephalic veins, and extending up the arm. The tumor is, of course, greatest in the median branches; but both the distension and the thrilling sensation are, on applying the finger, felt some way up the arm.

The tumor increases by hard labour and exercise. It is largest when the arm hangs; and both the enlargement of the veins and the thrilling sensation almost entirely subside upon holding the arm over the head. The veins do not subside upon putting a ligature

ligature on the arm below the communication. The motion of the blood is not only felt, but sometimes seen distinctly; and, if the ear be brought near the part, it is heard. It gives a hissing noise, as if there was a blast of air sent through a small hole.

The humeral artery is enlarged, and its pulsation becomes unusually evident. The pulse at the wrist is weaker and smaller than in the other arm. Lastly, on pressing the median-basilic vein with the point of the finger, so as to stop the hole of communication with the artery, the median and cephalic veins become empty bags.

The most striking peculiarity in this kind of aneurism is, that the blood which escapes from the artery finds a ready passage into the circulation, a free vent; and, consequently, there is neither coagulum nor very great distension of the tumor. When the trunk of the artery is compressed, and the bag of the vein emptied, the veins become full again the instant the communication from the artery is left free. When a ligature is put tight about the arm, above and below the dilated veins, the blood can be pressed into the artery again, and the artery will be found distended; which great distension of the artery again subsides on the removal of the pressure from the tumor.

In this kind of aneurism, no operation is required. It has been proposed to tie the communication betwixt the artery and vein; but that would certainly endanger the growth of a common aneurism; for the blood no longer having a free passage, might dilate the cellular communication. Compression is not

not likely to do good, and it only remains for us to perform the usual operation, as for the simple aneurism, if any were at all necessary, which happily is not the case. The patients have not even a weakness in that arm; and I have never heard of any bad consequence, as of hæmorrhagy, following the disease.

When I say compression is not likely to do good, I am aware of the practice of Brambila. *(Vide Acta Acad. Vindobon. tom.* 1.*)* In two cases, by the graduated compress and bandage, he succeeded in a cure: in one he failed. Stiffness and wasting of the arm will be the consequence of that degree of compression continued for a length of time, which is sufficient to obliterate the dilated vein.

I have no doubt, however, that in some cases a slighter degree of bandaging may be necessary to support the parts, and to keep a check upon the motions of the arm.

OF TYING THE VARICOSE VEINS OF THE LEG AND THIGH.

The branches of the great saphena vein in the leg, and the vein in its whole course in the thigh, are sometimes greatly distended, and irregularly hard; the valves have lost their action, and no longer support the column of blood. This disease often produces, or is complicated with, ulcers of the leg.

When we consider the great frequency of ulcers—the

the appearance which they present—the manner in which they are affected by the erect posture, becoming evidently darker—and their frequent combination with dilated and varicose veins, we must perceive how much the debility of the vascular system is apt, in the first place, to shew itself, by the yielding of the column of the veins to the pressure of the blood. The consequence of this we perceive to be a debility and interrupted state of the action of the small vessels of the leg and foot, and a tendency to ulceration on every trivial injury. We know in general, that the supporting of a part diseased, conduces to restore a healthy action. We conceive how a bandage by compressing, in a certain degree, the trunks and branches of the veins, restores the agency of the valves, made useless by the dilation of the veins, to such a degree as to prevent the valves from any longer meeting across the cavity of the veins. We perceive the correspondence between this view of the state of the circulation of the lower extremity with the practice of Mr. Baynton, in his treatment of ulcers of the legs, by adhesive straps and bandage.

The parts surrounding ulcers are thickened; for when the veins are dilated, their coats and the surrounding cellular membrane become thick and firm, from being stimulated by distension, and by the pressure and weight of the blood; and pressure relieves them both. For such ulcers with dilated veins, the operation described below, has been resorted to.

But much more frequently I have seen patients come for relief on account of the mere painful distension of the veins in the leg and thigh: a disease

more

more frequent in women*. The saphena vein is distended in all its length—it has lost the guard of its valves—the whole column of blood presses from the head and heart upon the veins of the leg!!! They become more and more distended, or rather permanently enlarged varicose tortuous, and hard in their coats; and when the patient stands long, there is an insufferable pain in the leg and ancle from their distension. It has happened that these veins have given way in some part, and the woman has almost instantly expired. Dreadful hæmorrhagy has taken place in many instances.

To remedy or prevent these evils, an operation is performed on this principle: that if we altogether obstruct the return of the blood by the trunk of the cutaneous veins, the blood will find other channels, whose valves have their action, viz. by deep seated veins, which lying under parts not allowing of distension, retain the use of their valves, which relieves the limb from the oppressive column of blood.

OPERATION.

Instruments.—A scalpel; forceps; and blunt hook, a common needle, or an eyed probe.

The assistant compresses the trunk of the vein, that the vein in the thigh may be distended: he then with his thumb draws the skin a little aside from the

* I imagine that straining and retention of the breath, is apt to distend the femoral vein, and to destroy the effect of the higher valves.

vein,

vein, that when the operation is finished, the skin may be retracted and cover the vein. The surgeon now makes an incision in the course of the vein*, generally about the middle of the thigh: in length about two inches, or an inch and a half, according to the thickness of the fat.

The vein appears covered with its bed of cellular membrane; which is to be nicely dissected by the side of the vein, so that the needle or eyed probe may be passed under the vein. The ligature may be of the common size, such as you would use for the arteries of the stump in amputation of the thigh. Tye it firmly—there is no fear of the breaking of the coats of this vessel.

The assistant now lets go the integuments which he had pressed aside with his thumb, and they cover the vein so that the ligature comes out obliquely from the wound.

A soft compress is applied above the ligature of the vein; and the leg and thigh is moderately bound by a general roller. The patient is enjoined to keep the horizontal posture.

The immediate effects of this operation are, that the swelling of the veins subsides; a slight pain is felt by the patient when we press in the course of the vein above the ligature. The distended veins of the legs and the varicose tumors, sometimes inflame a

* Not, however, directly on the vein, but a little to that side to which we have drawn the integuments. This is to avoid cutting the vein; of which, by the by, there is little danger in dexterous hands.

little;

little; but, subsiding, they degenerate into hard knots and cords, and the blood forsakes them.

This operation should not be performed when the patient has a teasing, though apparently trifling cough. For after the operation, I have felt the impulse given to the column of blood in the cava by the action of the abdominal muscles and diaphragm strike strong upon the ligature; and every occasion of inflammation must here be carefully avoided. This impulse may tear up the new adhesions; for the same reason, costiveness and violent straining of every kind ought to be avoided. To prevent the progress of inflammation along the vein, and to guard the ligature and inflamed part of the vein from distension, I advise the application of a compress above that part of the vein which has been operated upon.

It ought not to be concealed that patients have died after this operation, in consequence of inflammation of the vein, and irritative fever. In Guy's hospital I believe the operation is not performed.

The operation is very often performed for ulcers of the leg. These ulcers, depending on a varicose state of the veins, are generally low on the leg, on the ancle, or foot. They have hard elevated edges, and are of a dark or brownish red colour. A dark red extends over the skin around the ulcer, and varicose veins are around the ulcer. And upon the leg, the integuments, in general, are often thickened. The operation is thus described by Mr. Home.

The patient stands upright, and the inside of the knee being turned to the light, a fold of the skin is pinched up transversely to the course of the vein.

A cut

A cut being made across this fold when the skin is let go, a longitudinal incision is on the thigh, and the vein appears covered only with the apponeurosis. By making a little cut in the membrane on each side of the vein, (not dissecting further on its coats) the common silver-eyed probe, or a blunt silver aneurismal needle, may be thrust under it*. The edges of the wound are brought together by sticking plaster. On the tenth or twelfth day, the ligature comes away. We are indebted to Mr. Home for the operation on the saphena vein, who has the further merit of instituting it from a previous careful investigation of the pathological principle.

OF VARICOSE ENLARGEMENT OF THE VEINS OF THE SPERMATIC CORD.

The spermatic veins stand very much in the same relation to the column of blood with the veins of the thigh and leg, and they are liable to the same disease. I do not say that they are precisely of the same nature. This state of the veins of the cord attends the relaxation of the scrotum, and occasions a diminution of the testicle, with pain and uneasiness. It is a disease frequent in warm climates.

The treatment of slighter affections of this nature is evidently to suspend the testicle, and to bathe with

* We are to recollect that the vein is sometimes double, and that in this case both are to be tied.

cold

cold astringent waters. But there are degrees of this disease in which an operation may be safely recommended. It is when there are distinct varicose knots; and where they can be separated with the fingers from the main course of the vessels of the cord.

I have assisted my brother to perform the operation in this manner: the operater feeling the cord and vessels, separates this knot of veins from the spermatic vessels, and gives the upper portion to the assistant, to be held very tightly, whilst he holds the lower part himself; he then makes a cut through the integuments, and exposes the varicose veins.

But I must remark here, that if the surgeon or assistant lose hold, of that tissue of vessels which they know in the turgid state of the vessels to be those which form the tumour, they may find themselves at a loss in the middle of the operation, and to say, among the vessels of the cord, whether they have got the right vessels again or not.

Having exposed the varicose vessels, they are to be separated as much as possible. Then where they are attached by vessels above and below, a needle and common ligature is put round, and tied betwixt these ligatures. The tumor is next to be dissected away.

The wound is to be brought together with adhesive straps, dressed with a little lint; and the whole suspended.

How this operation restores the more vigorous circulation of the testicle, I am at a loss to comprehend; unless it be much assisted by the stimulus of the knife, as an old surgeon and friend of mine expresses himself: yet it certainly succeeds. I must, however,

ever, pointedly observe, that after an operation of this kind, on examining the extirpated part, I have seen a full inch of the spermatic artery in the centre of it. Here, where I thought the testicle would waste in consequence, the patient did well, and expressed himself highly satisfied and relieved.

This is one in the circle of operations; but not, I conceive, to be lightly performed, or on common occasions.

CHAPTER III.

OF STRICTURE IN THE URETHRA.

Symptoms.—In consequence of stricture in the urethra, there is a frequent call to make urine, with a straining to pass it. It flows in a wiry-forked stream, at an unusually long time after the effort has been made; and after the sensation of passing the urine has ceased, there is an involuntary discharge of it. Very frequently a long continued gleet has preceded the disease; or, at least, all suspicion on the part of the patient of his having such a disease. When the contraction in the urethra is considerable, and of long continuance, there is pain in the loins and hips, which is increased upon straining. The urine only drops away, or flows in a small spiral thready stream, and at very short intervals: and there is deposited in it a mucous sediment. The less frequent accompaniments are involuntary discharge of the urine; nocturnal emissions; excoriations of the glans; shooting pain in the perineum, with great tenderness; heat of urine, and paroxysms like the attack of an ague, and swelling of the testicle. Piles, or a descent of the inner coat of the rectum, not unfre-

quently accompany severe stricture, when attended with violent straining.

The surgeon may mistake for stricture, 1. the action of the *accelerator urinæ,* in a very irritable state of the urethra; or, 2. the obstruction of the bougie, from its point entering one of the lacunæ of the urethra; or, 3. an enlargement of the prostate gland, and an obstruction from the awkward management of the catheter, when it should turn under the pubes.

The danger of stricture is, 1. chiefly inflammation of the bladder; and this is to be dreaded when there is violent pain in the back, and pelvis, and thighs, with much mucus in the urine. 2. Total obstruction (a case which I have twice seen), in consequence of a small stone in the urethra, lying behind the stricture, and acting like a valve. Or, lastly, there may be fistulous openings from the urethra, and a discharge into the cellular membrane of the perineum—a very frequent cause of death, but not irremediably so.

The practice to be observed in the case of suppression naturally calls for our first attention.

I shall suppose that the catheter cannot be introduced, and that the obstruction is occasioned by a stricture aggravated by excess in drinking, or by sudden cold, or a large slough, and much swelling of the parts after the application of the caustic. The dangerous symptoms in this case, are pain and swelling in the lower part of the belly, with heat, thirst, and increased pulse.

The

The most alarming and fatal symptom in continued obstruction of urine, or in a case of diseased bladder, is stupor, proceeding from an affection of the brain, and hickup from the sympathetic affection of the stomach. If the attack is relieved by occasional dropping off of the urine, he may die of the irritation. If the obstruction is obstinate, the patient dies by the urine escaping from the bladder into the abdominal cavity.

Our only hope in this case is from getting a small bougie passed into the bladder, upon withdrawing which the urine will flow; or the mere introduction of a bougie down to the obstruction, letting it remain there for a little time, and then withdrawing it, will often produce a discharge of urine *. If this fail, and if care has been taken not to aggravate and increase the obstruction by violent efforts, we have to endeavour next to correct the state of the system, which has produced this effect. This is to be done by taking blood freely from the arm, and (by leeches) from the perineum; by fomenting the perineum and penis, or setting the patient down in the warm bath, or semicopium; by giving a smart purge, which very often takes off both spasm and inflammation; by large and separate clysters of warm water; and, lastly, by a powerful anodyne in a

* The bougie in this case seems to act by producing in the urethra the sensation and action which accompanies the flow of urine. After the urine has begun to flow, it passes more and more freely.

starch clyster. These failing, the puncture of the bladder is our next resource *.

Supposing that this immediate danger has been subdued, or that the patient first presents himself with only the usual symptoms of stricture, we have first of all to ascertain the place and extent of the disease in the canal.

OF SOUNDING THE URETHRA, TO ASCERTAIN THE PLACE AND EXTENT OF THE STRICTURE.

As in a natural state the orifice of the urethra is the narrowest, or rather the least dilateable part, we must, in the first instance, adapt the size of the bougie to it. It is a general position, that the larger the bougie, the chance is the less of its meeting with any accidental interruption †, and consequently there is the better assurance of its stopping at a stricture only.

Having dipped the bougie in oil, it is introduced a little way into the urethra. Then the penis should be moderately stretched with the left hand, and held steady; when, with an easy unrestrained motion of the wrist and fingers, the bougie should be introduced. The motion ought not to be too slow, nor

* See *Of the Operation of Puncturing the Bladder.*

† The bougie, when very small in the point, is very apt to catch on the lacuna, and on a fold of the urethra, when it is making the curve under the os pubis.

on the other hand, the bougie harshly introduced, otherwise the resistance and size of the urethra is not so easily felt. The stricture is generally at the distance of five inches, six, six and a half, or seven inches from the point of the penis*. Sometimes there is felt only a degree of hesitation and difficulty in the bougie passing the first stricture, while it sticks fast in the second †.

When with a bougie of the largest size we are opposed by a firm stricture, we mark the depth of the stricture on the bougie, and, withdrawing it, take successive smaller ones, until we find one which passes the obstruction, when we proceed to examine the whole extent of the canal.

Supposing that, disappointed in passing the larger bougie, we introduce a smaller one; if it does not pass, it sometimes, when withdrawn, will have the point turned directly backward, in which case most probably it has hit upon the angle made by the stricture (B. plate I. fig. 7.), and has been directed

* Were I to follow my own experience alone, I should say that stricture is more generally about five inches from the point of the penis, or even nearer, than in any other point. I have uniformly found the first stricture the narrowest, though the deeper ones were more difficult to remove, and attended with more severe consequences on the application of the caustic.

† We cannot examine the urethra with a conical bougie without perpetual chance of mistake, from its being wedged in the first stricture, which feels like the opposition of a second.

over

over the mouth of the opening, so as to be reflected on itself. If it has been pushed against the opening directly, the point will infallibly shew some appearance, by its being flattened (not blunt and obtuse), or it will be sharpened, as in fig. 8. the point having entered into the stricture. The curve B. will be a direction by which we have to make the succeeding effort, as it shews us how the permeable part of the canal is removed from the direct line.

When obstruction is felt, which our bougie, with moderate perseverence, will not pass, we have next recourse to the soft bougie.

The *soft white bougie* is used to take an impression of the stricture, in order in some measure to ascertain its degree and extent. It is pushed down to the obstruction, and allowed to remain there until it becomes soft; and then it is gradually pressed with a very steady hand into the stricture*, where being allowed to remain a little time, it takes the impression of the stricture, and upon withdrawing it, often informs us of some obliquity of the passage, which enables us to pass a bougie curved upon the model of the soft bougie. It teaches us also to apply the caustic with effect.

Under fig. 4. we have a stricture represented A. Suppose that the soft bougie B is pressed into the stricture, then the greater projection of one side of

* In many patients this operation is impossible, from the painful state of the parts.

the

the stricture C has a corresponding indentation in the bougie D, and by withdrawing the bougie without twisting it at all, we learn where the caustic is to be applied.

Again, when we are endeavouring to pass a small bougie, suppose that the point shows a projection, as E, fig. 4. we know that the opening is very small, and to the right side. We accordingly give the small bougie the curve F, which throws the point into the direction of the orifice of the stricture.

Mr. Hunter, with his usual correctness, has said that a stricture is of very small extent, and resembles the effect of tying a thread round the canal. But this fact I think has been proceeded upon too blindly. Before the caustic is used, a very accurate survey of the canal should be made. I have now to propose the use of probes, which give, I conceive, much more accurate information of the extent of the stricture than the bougie. In plate I. fig. 1, 2, 3, we have a series of plans, shewing a variety of strictures, and the application of the bougie and the probes. In fig. 1. there is a stricture of the common kind, and in fig. 3. we have the point of the bougie introduced into such a stricture. If this bougie had been of an equal thickness in all its length, it would have passed the stricture with a uniform degree of difficulty. But as it is conical towards the point, it has only entered the stricture, and sticks there; and when softened, it begins to yield and curve in the upper part of the urethra, giving a deceitful sensation of still proceeding. In neither of these cases is any information conveyed to the operator of the extent of the disease.

disease. And although very often the contractions are merely such as are represented in fig. 1. and 3. yet I am well assured that they are often far from simple; that there are irregular contractions for half an inch or an inch in length, in which case it is fifty to one whether, in the common way of introducing the caustic, it follows the course of the natural canal.

To ascertain the extent of the stricture, I procured a series of silver and gold probes, with circular knobs (as represented in fig. 1. and 2.), the knobs varying from the full size of the urethra to what will just pass the narrowest stricture. By successively introducing smaller balls, I ascertain the degree of stricture by the ball which passes easily, and I am secure of being in the passage by passing the probe onward when it has got beyond the stricture. And by the slight feeling of resistance in passing the ball, and in withdrawing it again through the obstruction, I ascertain the extent of the contraction. If the ball of this probe be liable, like the point of the bougie, to enter one of the lacunæ, or, passing it, to rub upon the edge, yet, by feeling whether the same roughness or difficulty attends the withdrawing of the bulb of the probe, as when it passed downward, we may be assured whether there be a stricture and callosity of the canal, or whether the obstruction be not caused merely by the lacuna; for as the lacuna present to the orifice of the urethra, their edge cannot catch the probe in the course of its being withdrawn; and consequently, unless there

there be a disease there is a uniform smoothness in withdrawing the instrument.

Again, in fig. 2. there is an irregular hardening of the urethra for a considerable extent, along which the probe moves with hesitation and difficulty, while in fig. 1. having passed the obstruction, it moves on with freedom. These balls then ascertain the nature and extent of the stricture.

I give importance to this knowledge of the extent of the stricture, because I apprehend that the practice and method of cure is to be varied with the circumstances.

Further, with the bougie we are seldom able to ascertain the number and probable obstinacy of the strictures below the first; while with this instrument, the ball passing the first stricture, we are enabled, from the fineness of the wire, round which the stricture cannot close, to examine the second stricture with equal facility as we did the first.

OF THE BOUGIE AS A CURE FOR STRICTURE.

The too sanguine favourers of the application of the caustic in stricture, have misconstrued the operation of the bougie in this disease, when they say it operates like a wedge merely, and dilates the passage. By the pressure of the bougie, an action is excited in the stricture, and the activity of the vessels adapts the form of the canal to the state of dilatation.

tion. The worst attendant on the use of the bougie, however, follows this—it leaves an action in the part on its removal, the tendency of which is to re-produce the disease. And further, I do not doubt that the bougie remaining wedged in any part of the urethra, may produce that low degree of excitement of the canal which tends to increase the contraction in the stricture, upon which it does not operate by distention.

The operator has first to measure accurately, with a common sized bougie, the exact place of the stricture: then, taking one of a conical form, he marks upon it the depth of the stricture, by comparison with the other. On introducing it, he knows that no lesser obstruction short of the full depth, as marked, can be the stricture. He now presses gently, and ascertains that he has introduced the bougie into the stricture, by its sticking when he slightly attempts to draw it back; and when it gives the feeling of having passed the contraction, he can ascertain the fact, by quitting his hold of the bougie, and observing whether it recoils, and rises a little from the urethra; for it does so when it is bending in the canal, and not entering the stricture.

Upon withdrawing the bougie, and examining the point, we have to observe whether the end be blunted; in which case either the stricture must be close indeed, or it must have struck on the angle formed in the urethra by the prominent stricture. If the bougie is sharpened or flattened towards the point, it has probably entered the stricture, and we are made certain of this, if there be a defined circu-

lar

lar impression round the bougie, at a little distance from its point.

"The time that each bougie should remain in the passage, must be determined by the feelings of the patient; for it should never give pain if possible." At first, a few minutes (in an irritable urethra) may be sufficient: and in this case our endeavour should be to subdue the irritability; for until the bougie can remain for hours, we can have little expectation of removing the stricture. If the stricture retains any degree of the natural elasticity of the canal, we may proceed rapidly to increase the size of the bougie; but when it is firm, a change of structure being a necessary prelude to our success, the pressure must be more gradually increased.

When we are operating for a permanent cure with the bougie, and not merely as a previous step to the use of caustic, having gained a fair lodgement, we ought then to use a bougie of a uniform thickness, and precisely adapted to the stricture. This will remain (once being introduced) with less trouble and irritation, than one of a wedge kind, or with a pyramidal point*.

It ought not to be concealed, that it is the practice of some so to press with the point, in using the bougie, as to produce ulceration; or, what is worse,

* In this case, as the bougie has sometimes slipped entirely within the urethra, we will naturally use some little contrivance to retain it in its place, and at the same time to prevent it from disappearing altogether.

forcibly

forcibly to break down the stricture, either with the bougie or with a strong silver probe. Of this practice I profess to know nothing; and I should imagine that the simple fact of the strictured part being the strongest and firmest (the most condensed) part of the urethra, should be a sufficient interdiction against it.

I have had, as yet, little opportunity of judging of the merits of the metallic bougie; yet my experience enables me to say, that when they can be used, there is less irritation, and less discharge from the urethra: and I have thought that the stricture was more quickly removed than with the common bougie.

OF THE CAUSTIC.

The propriety or safety of applying the caustic to the stricture in the urethra, is measured by the degree of pain felt on the introduction of the simple bougie. It is to be deferred where there is fever or much irritability, or when there is an inflammatory gonorrhœa: it is to be avoided, if possible, in very old men.

The bad effects which may be brought on by the use of the caustic, are an attack of fever like the fit of an ague; high irritability of the urethra, hæmorrhagy from the urethra, swelled testicle, affection of the stomach with giddiness, and plugging up of the urethra by the slough.

I have been particular in describing the manner

of ascertaining the exact place, direction, and extent of the stricture; because I am too well assured that it is in this that the general practice is deficient. All kinds and degrees of surgeons venturing in the slightest and in the most desperate cases to try the caustic without discrimination.

There are two methods of applying caustic to the urethra. That with lunar caustic, proposed and practised by Mr. Hunter, with the improvement and observation of Mr. Home; and that proposed and practised by Mr. Whately, in which he uses the caustic alkali.

The lunar caustic is peculiarly well adapted for a stricture of small extent, which is the most general kind of obstruction. It alone must be used where there is absolutely no passing of a small bougie previously. But there are strictures or diseased narrowings of the canal, extending to half an inch, or an inch in length, and regular in their course. In these cases we must either retain the use of the common bougie, or adopt that practice recommended to us by Mr. Whately: for to attempt burrowing with the armed bougie through the firm strictured part of the canal for so great a length, when the surrounding parts are comparatively loose is in a high degree dangerous; and resembles more, I think, the effect of a tenacious adherence to what has been done before, than an open manly conviction of the superiority of the practice. I conceive, on the other hand, that the application of the kali purum is not adapted to that case of simple stricture; in which, a point directly presenting to the extremity of the bougie,

bougie, (as in plate I. fig. 1. and 3.) is to be touched with the caustic: for as this caustic liquifies, it must lodge chiefly in the angles and wider parts of the canal.

The bougie armed with the lunar caustic, is introduced with one uniform motion down to the stricture, and there it should remain for half a minute; or, perhaps, three quarters; but not, in my opinion, more than a minute. After this, the secretions of the urethra are poured out, and the caustic liquifies. I think it, therefore, much better to withdraw the caustic, and either introduce the same anew, or another bougie after a few minutes. This surely is preferable to keeping the caustic in the urethra for three minutes, which some are even in the practice of doing.

The bougie for conveying the caustic, should be of a full size; and the caustic in the centre should complete the circular end of the bougie, as in fig. 6. B. The shoulder A, should be full and round, so that it may dilate the canal, and ensure the application of B, to the centre of the stricture*.

I find in the shops' bougies, of the form of fig. 5. the extremity being quite flat, and presenting the caustic A, just within the margin. But, as I conceive

* If it shall be thought that this exposure of the caustic may hurt the urethra in its passage down, we have only to give the extremity of the bougie a thin coat of mucilage, and allow it to dry. In the withdrawing of the bougie, the caustic is so coated with mucus, that it does not burn the urethra.

it,

it, the effect of this must be, that the caustic does not touch the centre of the stricture, and cannot enter it in any degree. Nay, rather the point B, is apt to be burnt; and a lodgement is formed there by the side of the stricture, opening the spongy body of the urethra, and attended with hæmorrhagy. A false passage needs but a beginning, for afterwards on that point the bougie will always hit; and to this form of the bougie, I attribute false passages in some instances*.

If we apply in idea the caustic, fig. 5. to the delineation of the stricture, fig. 2. we shall comprehend the difficulty of making way by the caustic through such a length, with any likelihood of keeping in the tract of the canal. It is in such cases that we should operate on the principle of Mr. Whately's improvement.

In using the caustic bougie, we have to proceed thus: we take a bougie of the common kind, which we know to be adapted to the urethra; but the extremity of which will not pass the stricture. We take a caustic bougie of the same size and form; we oil them, and lay them by us, for if kept in the hand they lose their firmness. Then taking the glans penis in the hand, the simple bougie is introduced with a slow uniform motion, until it meets the stricture. Having ascertained its relation to the stricture,

* When the caustic and bougie is evidently making progress, and yet the urine flows with as much difficulty as before, we are to suspect that a false passage is forming as in the direction of the dotted line, fig. 7.

it

it is withdrawn; and the armed or caustic bougie introduced with a like motion of the wrist and fingers, until it is opposed by the stricture: then it is gently pressed. We note the commencement of the burning pain, and retain it for half a minute after.

The contractions of the urethra, which extend for some length in the canal, are, for the most part, accompanied with fistula in the perineum; but whether they are or not, they are always very difficult of cure. We ought, in the first instance, to endeavour by the introduction of the smaller bougie, to procure some alleviation of the distress and difficulty of passing the urine. There is often an inequality and obliquity in the course of these strictures, which is considerably relieved by the use of a small bougie, even when the urethra is not actually enlarged by the bougie. From what follows, of the use of the caustic, as recommended by Mr. Whately, there will appear a necessity for the stricture being permeable to a bougie, before we attempt a perfect cure; and, indeed, the great nicety in the treatment of stricture is in the introduction of small bougies during this first stage of the cure.

OF THE APPLICATION OF THE CAUSTIC IN A LIQUID FORM, TO THE LONG CONTRACTIONS AND CALLOSITIES OF THE URETHRA.

A bougie is taken of a size which will pass the stricture, and of a consistence rather firmer than common. The end of it is a little opened, and there is

is then introduced into it a piece of the KALI PURUM: in size about half a pin's head. This caustic is not intended to touch the urethra, but to melt and flow from the little opening when in contact with the stricture. Having previously marked on this bougie the precise depth at which the stricture lies from the urethra, it is introduced down to the stricture, and there allowed to remain until the caustic shall have dissolved. The point of the bougie is then passed slowly through the stricture, so as to come in contact with its whole surface. The bougie is to be thus passed through the stricture several times, and the operation repeated at the distance of some days*.

In this operation we proceed gradually; accommodating the severity of the application to the obstinacy of the disease, and to the degree of sensibility or irritability in the part, or in the constitution; and the superiority of the method consists in this, that no false passage can be made.

There are certainly objections to this method of applying the kali, which are to be opposed only by the greater danger of applying the lunar caustic in strictures of great length. The caustic is here applied in a liquid form, and rubbed into the stricture; but when we run a black or inky fluid into a canal, where do we find it lurking? in the hollows and depressions—in the rugæ; not on the point of any natural or accidental eminence. So must the dissolved al-

* The immediate effects of this caustic is a slight scalding sensation in making water, and a gleety discharge from the urethra for a day or two.—*Whately.*

kali in this operation pass beyond the prominent points of the stricture, insinuate itself into angles, and affect more powerfully the wider parts of the canal than the stricture itself. This it certainly must do in short strictures; and it will be applied without affecting the natural part of the canal, only in strictures of some length, in which it may be allowed to dissolve and exert its activity. I cannot help saying, though contrary to the opinion of Mr. Whately, that during the use of this caustic, it will be assisted in its operation by the occasional introduction of the simple bougie*.

I trust, that in endeavouring thus to assign the proper cases for the bougie, the lunar caustic, and the alkali, I shall not be accused of an imbecile attempt to accommodate my opinion to that of the several authors who have written on this subject. Stricture in the urethra is, in individual cases, attended with so many distinct and peculiar circumstances; it is really so varied in its situation and degree; and

* Nay, since writing the above, I have ceased to think of producing a sloughing of the stricture, by this alkaline caustic, but only to produce in the canal a disposition to dilate under the bougie. It is admirably adapted also to facilitate the introduction of the bougie into a narrow stricture. Thus, if after trying in vain to introduce a bougie, we withdraw it, and arm it with alkali, and again introduce it, no sooner has the alkali remained for a little time in the neighbourhood of the stricture, than a soap is made, which facilitates the introduction of the bougie through the stricture. But although the bougie glides now through the stricture, without the further use of the bougie, we shall not gain all the advantage.

in

in every instance so nice and difficult of cure, that it seems to me to require more discrimination than is generally bestowed in the preliminary steps and inquiries, as well as in the adaptations of the methods of cure. As improvements and new suggestions are offered us, we require in justice to the public, to be jealous of our individual partialities; and in no instance, perhaps, is prejudice so apt to arise in favor of a particular method, merely because it is our own, as in the cure of strictures.

In very obstinate stricture, attended with continued and ineffectual straining, and violent paroxysms of fever, threatening the total overthrow of the patient's constitution, I have been induced to consent to a more speedy removal of the obstruction. In the instance to which I allude, there was a callous and intricate fistula in the perineum, about four inches and a half from the extremity of the urethra, a stricture of at least an inch in length, which was felt like a cord through the integuments of the penis; and up to this point the stream of urine came with great strength, distending the canal of the urethra to half an inch in diameter.

OPERATION.

A CANULA of silver was introduced down to the stricture. The patient then made an effort to pass the urine; and when the urethra was fully distended, a stilette was introduced into the canula, and carried along the diseased part of the urethra, until it en-

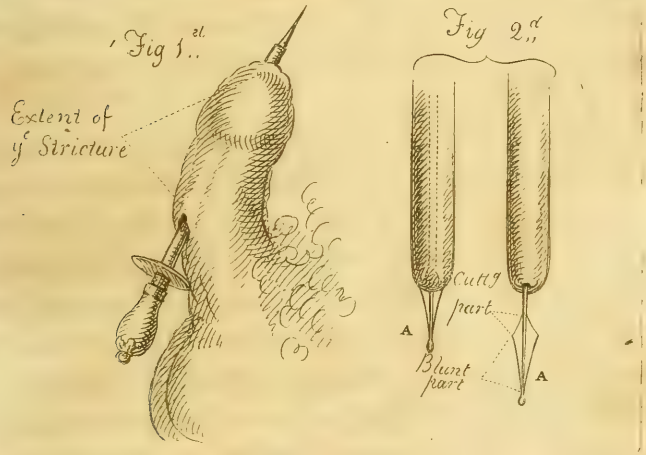
tered the dilated part of the canal. These being withdrawn, a bougie was introduced into the passage.

This, however, is a very difficult operation. To the feeling, nothing is more easy than to hit the lower part of the canal, but it really is very difficult. And when my opinion as to the manner of operating was afterwards taken in a similar case, I advised strongly that the stricture should be pierced from below, by first making an opening into the sound part of the urethra, and then passing the canula and stilette upwards through the urethra, to the point of the penis.

I assisted Mr. Lynn, of Westminster, in the following case. A stout healthy young man had a stricture within an inch and a half of the extremity of the penis, of a full inch in length, quite firm and impervious to the urine, which passed in a free jet from the side of his penis. It was not a stricture from a common cause, but in consequence of a bruise. A small fistula lacrimalis probe was pushed with great difficulty down from the point of the urethra through the stricture. The end of this fine probe lying in the sound part of the urethra, was cut upon; then a common trochar and canula was, by the direction of this probe, pushed upwards to the point of the urethra. The stilette of the trochar was then withdrawn; and an eyed probe, with a large seaton, was introduced through the diseased part of the urethra; and a catheter passed into the bladder from the incision.

The large skein of cotton-thread in the upper part of the urethra, produced profuse suppuration, and made

made a passage large enough for the catheter of the largest size. When the suppuration was fairly established, the catheter was withdrawn from the wound, and introduced in the usual method. In a very few days the wound closed, and the fistulous opening had entirely disappeared.



This represents the second stage of the operation, when the trochar was passed from the incision into the urethra at A, up to the point of the penis B. The original plan of the operation was on the withdrawing of the stilette, to have infixed a large bougie on the extremity of the canula; then to have drawn it thus through the stricture, and finally introduced it into the bladder. Circumstances made this difficult, and the large seaton was introduced, and certainly answered the purpose extremely well.

C, the extent of the stricture,

Wherever the bougie or caustic will not enlarge an intricate stricture, which affects some considerable length of the canal, I have little hesitation in saying that the stricture should be cut; but not perforated in the way here attempted. For when we try to push a stilette down upon a stricture, the chance is equal; at least that we pass from the tract of the canal, into the body of the penis. We must, therefore, contrive to cut the stricture as we withdraw the instrument, having previously ascertained that it was in the canal. The instrument is introduced down to the stricture; then the probe point A, fig. 2, is pushed onward through the callous part of the canal. In this movement it does not cut. It may enter with difficulty; but this is the only difficulty in the operation. It is then withdrawn; and, as it is withdrawn, it cuts and notches the whole length of the stricture. You then introduce a bougie, of a size to distend the passage fully. Here there is an immediate enlargement of the canal. In six hours the bougie being withdrawn, the urine is passed with a full stream; but we must persevere in the use of the bougie.

OF FISTULA IN THE PERINEUM.

When the stricture of the urethra is of long standing, and progressive, there is in proportion to the closeness of the stricture, an increase of muscular power in the bladder, attended with a high excitement of the whole extent of the urinary canals. The last effect of this continued irritation is an ulceration of the urethra behind the stricture, and an escape

escape of the urine into the cellular membrane of the perineum.

Should it happen that, by accident or sudden increase of the obstruction and violent effort of the bladder, the urine is driven into the cellular membrane by the neck of bladder and of the perineum, the case comes to be attended with the utmost danger. The acrid urine flows under the integuments, and stimulates the cellular membrane: sometimes it will pass into the loose cellular membrane of the scrotum, and distend it until it be nearly as large as the head. The constitution immediately suffers. There is shivering followed by inflammation. The patient becomes irritable and low, and his pulse quick and small, accompanied with loss of appetite, thirst, and delirium; and the parts fall into gangrene or slough. Should it not prove fatal in this way, yet the inflammation and the extensive destruction of the cellular membrane is alarming even as a local complaint.

We have only, in this event, to make a free outlet for the urine, by a simple but decided incision; to bathe the parts with emolient fomentations, and to support the patient. Generally, however, the ulceration of the urethra proceeds more gradually, and the parts inflaming there is not this extensive infiltration of the cellular membrane: but an abscess is formed, which pointing in the perineum, is discharged, so that afterwards the urine flows partly through this fistulous opening, and partly by the urethra. Successive inflammations arise, the urine passes with more difficulty, and new abscesses are formed

formed. The whole integuments of the perineum and scrotum are inflamed, swelled, and full of irregular hardness.

In most cases, to eradicate the cause by destroying the stricture, cures the disease; for it is the difficulty of passing the urine by the urethra which necessarily directs it into the irregular sinuses, by the side of the natural passage; and which keeps up the irritation and the disease. If the stricture is entirely removed, and there is no great destruction of the canal, the inflammation and hardness soon subside, and the ulcers close. But when the fistulous opening is of long standing, and the urethra is callous, and closed almost entirely for a considerable extent, then the urine is driven amongst the cellular membrane of the perineum; tubes of condensed cellular membrane are formed; these are sometimes not confined to the perineum, but extend foreward into the scrotum, or even backward to the neck of the bladder, or the extremity of the gut. This state of the parts requires a different operation—one ill to suffer, and requiring dexterity and niceness in the operator.

OPERATION.

Instruments.—A variety of catheters and probes, metallic flexible catheters and bougies, a syringe, sponge, lint, &c. and the common pocket case.

The patient is placed in the position as for lithotomy. A streight catheter or sound, A, is introduced into the urethra, down to the obstruction, B. Then a probe, C, is introduced into the fistulous opening in the perineum. Often the streight probe will not follow the obliquities of the canal; it must be bent, and made if possible to hit upon the extremity of the catheter or sound. It cannot be made to touch the catheter, because the catheter is within the urethra, and above the stricture.

The diseased integuments of the perineum are now to be laid open down to the tract of the urethra.

If

If there is one sinus leading towards the stricture, it is to be followed; but if there are several, and they run deep backward, it is impossible or improper to follow them towards the neck of the bladder. In this part of the operation, a decided incision, and a fair wound, is to be wished for. A diffident groping and cutting, without any precise view, keeping the patient for hours, I may venture to say, on the table, may be (and I know has been) followed with inflammation, which in this exhausted and irritable state of the patient has proved fatal *.

In severe operations of this kind, there will often follow, in consequence of the continued pain and irritation during the operation, sickness and vomiting, and pain of the belly and swelling of the testicle.

The most difficult part of the operation is to find the urethra behind the stricture. The bulb and spongy body of the urethra is now no mark. The parts are massed together by inflammation, and new divisions are formed by fistulous tubes and sinuses. The urethra is not like an artery, gaping and open when cut. On the contrary, I have seen the operator cut it in all directions, both in this and in other operations, without being able to discover its cavity. If we should fail in attempting to introduce the probe into the fistulous communication, we must cut upon the stricture and the point of the staff; and

* Many of the cases which we hear of in general, where a man dies after the operation for a fistula, are cases where the parts are in a gangrenous state, as I have described in the first instance, and no blame should attach to the surgeon.

now

now again searching with the probe for the continuation of the canal towards the bladder, and having found it, introduce the catheter from the point of the penis, past the stricture, down into the bladder.

The relief from the free discharge of urine by the catheter is immediate. The parts consolidate and heal over the catheter, the wound being kept open until it granulates from the bottom.

In a few days, when the granulations shall have covered the catheter, and the tract in which it lay is consolidated, it may be withdrawn, and a common bougie introduced. As far as I have been able to observe, the urine will not make its way into the perineum again, as long as the urethra is free.

OF CUTTING OUT PART OF THE URETHRA.

But I have now to describe a still bolder and more decided operation. It often happens that in these diseases of the perineum, the urine obtaining a free discharge by the fistulous opening, the original stricture is more and more contracted, and a considerable part of the canal is totally obliterated. This contraction and increase of the length of the stricture is no doubt accelerated by the successive extension of the inflammation in the perineum; and very often in this complicated state of the disease, there is a large quaggy swelling of the integuments of the perineum, great part of which it were better to take away by a double incision in the first part of the operation.

In this operation, one longitudinal incision in the length of the diseased integuments of the perineum,

or

or two, including a portion of the diseased skin, may be necessary. In this the state of the parts must be our rule and guide.

Now the parts are to be pretty freely dissected, while we endeavour to make distinct the bulb of the urethra. The fistulous opening into the urethra is next to be sought for; and a staff, or sound, or catheter, having been introduced into the urethra, down to the upper part of the stricture, the tract of the diseased urethra, and the point of the staff, is to be explored; and if the urethra proves entirely diseased for some length, it is to be cut out. Now a bougie of the largest size is to be introduced from the wound, into the bladder, and another from the extremity of the urethra down to the wound. The parts are to be slightly dressed, and the patient put to bed.

After a few days, when suppuration has taken place, and the granulations are sprouting up about the bougie, it is to be withdrawn, and the catheter introduced along the whole length of the urethra; over which, if it be kept steady, and in a good situation, the parts will soon heal.

After the first dressing, when we find that the inflammation is not likely to run to any dangerous degree, we must dress with a stimulating ointment, on slips of lint, and over this put a warm poultice, which will promote healthy granulations.

From a case of Mr. Lynn's, I have represented the appearance of the state of the wound when the bougies should be withdrawn and the catheter introduced. But now, if the case be neglected, and the catheter allowed to hang, bearing down the penis, it will

will stretch the parts, so that the lips of the wound will contract behind the catheter, and the part becoming callous, the catheter will be left bare, and a cicatrix be formed behind it.

OF FORMING A NEW URETHRA, WHEN PART OF THE CANAL HAS BEEN DESTROYED BY ULCER.

A WASTING ulcer, during a mercurial course, will sometimes run down from the corona glandis, under the prepuce, and eating into the substance of the penis, not only lays open the urethra, but altogether carries it away. A gentleman presented himself to me in this situation, having uniformly met with discouragement from several eminent surgeons, to whom he had applied, they told him it was common but irremediable. He had two strictures at the same time, and the urine flowed from the side of the penis.

I engaged myself, in the first place, in destroying the strictures, so that the canal might bear a silver canula lying in it. I then dilated the part of the canal towards the extremity of the penis, to see whether the urine would by this means leave the opening in the side, and take its proper channel; but indeed this I could not expect, as the canal was actually deficient about an inch and a half. I was reduced to the necessity of performing the following operation.

I had a silver tube made, six inches in length, and adapted to it a rod of soft metal, which projected through it with a probe point. I had also a very sharp stilette fitted to it. I had likewise a directory

of

of somewhat peculiar figure, to pass into the opening of the urethra in the lower part of the penis.

In the operation I introduced my canula and its probe-pointed stilette down to near the place of opening in the urethra. I then introduced the directory into the opening from which the urine was wont to flow, and pointed it downwards to the perineum, the groove of the instrument being towards the body of the penis. I now gave this directory to my assistant, and withdrawing the probe which was in the canula, I introduced my sharp stilette, and pushed the point through the canula: now, taking this stilette and canula firmly in my hand, I directed the sharp point obliquely from the proper course of the canal into the body of the penis, and then carried my instrument behind the tract of the urethra, until I got below the place where the urethra was deficient; then taking the directory in my left hand, I made the sharp point of the stilette grate into the groove of the directory, and of course into the proper course of the urethra; then, holding the canula and directory very firmly, the sharp instrument was withdrawn from the canula, when the probe was again introduced, and being pushed along the groove of the directory, the canula was fairly lodged in the lower part of the urethra.

Through this canula the urine passed freely, not a drop escaping by the former breach in the urethra; and during the operation not a drop of blood passed; my assistant expected some basons full. I considered three weeks necessary to consolidate the new passage into a firm canal. The only difficulty was

in

in retaining the tube in its place, and keeping the extremity which was in the urethra from inflaming the canal. This I found could best be accomplished by introducing one of Mr. White's flexible metallic bougies, which, passing beyond the sharp edge of the tube, kept the urethra from pressing upon it, and prevented the penis from bending at that part. A T bandage being brought round the perineum, and split, received the end of the bougie, and pressed in the silver tube, so that it could not escape by accident, or by the impulse of the urine.

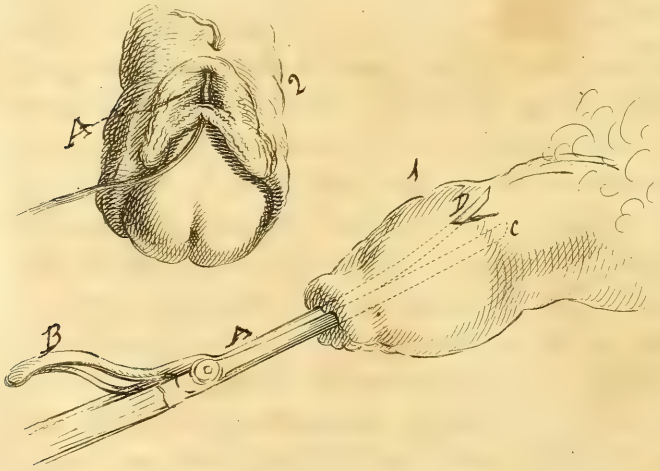
By wearing this tube for some time, and afterwards by the use of the common bougie introduced into the new passage, I made a complete canal. But one circumstance has failed in accomplishing a perfect cure. The gentleman can turn to the wall, like his neighbours, without the danger of spoiling his silk stockings. The semen too, I believe, appears at the extremity of the urethra; but still there remains a lateral passage. The reason is this—the new canal joins the proper urethra a little below the opening of the urethra upon the surface. This part has been quite pressed flat by the canula, and much contracted; but by no means as yet have I been able to destroy the natural tendency of this part to secrete, instead of taking on a proper suppurative action, to produce a raw surface, and to unite.

By applying the practice in this operation to the common case of bad fistula in the perineum, I expect to make it a much simpler operation, and attended with less chance of the high inflammation which often proves fatal.

CHAPTER IV.

OPERATIONS ON THE PENIS.

In phymosis, whether natural and congenital, as it often is, or the effect of disease, a kind of gonorrhœa from the internal surface of the foreskin, attended with high inflammation, and leaving behind it thickening and contraction of the preputium, the operation is the same. The preputium is to be completely cut up, and the glans freed.



There is an instrument, the phymosis knife, A, which is a union of the directory and sharp-pointed bistory; the latter lying concealed until raised and pushed forward by pressure of the thumb on B. This instrument is introduced under the foreskin up to the point C, and then the pressure being made on B, the sharp-pointed knife D is pushed through the skin. When the knife is thus raised from the groove of the other part of the instrument, which serves as a directory, the instrument is to be withdrawn, the knife still being kept elevated, and cutting itself out, the preputium is laid open.

I have always cut the preputium in the middle, not on the sides; and the two flaps have contracted in a way natural enough. It will, however be observed, that a larger branch of the veins is apt to be cut in this way.

When the parts are not previously inflamed, when we are operating for a natural phymosis, there happens a thing which those operating in the diseased state of the parts are not aware of, namely, the separation of the two lamina of the skin, as in A, fig. 2. for example. In this case, we take our smallest needle, and make a stitch with a common thread, drawing the skin together at the angle or termination of the incision; and if there is troublesome bleeding (at least disagreeable if not alarming to the patient), we include the bleeding orifice in this slight stitch, which is to be brought away on the removal of the dressings.

The dressing required is merely a slip of dry lint introduced betwixt the lips of the wound; and the

supporting of the penis against the pubes by any slight bandage.

Many surgeons prefer doing the operation by two lateral incisions. It requires no further description. There will be less hæmorrhagy in this manner of performing the operation; but that is never a matter of importance.

AMPUTATION OF THE PENIS.

Instruments.—Scalpel, two tenaculums, dissecting forceps, sponge, lint, &c. The surgeon will find occasion for two assistants. Simple as the operation is, I have taken up six, and have seen eleven vessels tied on the penis, after amputation of a large cauliflower excrescence.

The young surgeon must well remember the necessity of carefully distinguishing the cancerous disease of the penis from the more common warty excrescence. I have seen a man just about to lose his penis, on account of a combination of phymosis with these warty excrescences from the glans, and which had burst through the prepuce with a very malignant-like distortion. But the prepuce being freely cut open, the luxuriant crop of harmless warty excrescences started forth.

The penis has been cut off when the prepuce was the sole diseased part.

The venereal wart has a spreading mushroom-like top, and slender base; and if the intermediate parts can

can be seen, they retain their natural appearance. A tubercle formed in some of the glands of the preputium is often the beginning of cancer in the penis. It is at first an irregular warty excrescence, with a broad base, in the substance of the preputium, or on the frenum. Of the advanced state of the disease, the following description was taken when the parts were before me.

Within the open sore it is a dark red, covered with a sanious discharge: the bottom of the sore is not spongy, but solid: there are deep excavations—irregular, cauliflower-like excrescences: the margin of the skin is swelled, tuberculated, and standing out from the sore, whilst the irregular ridgy edge is curled inward. The skin in the neighbourhood has a purple colour, is thickened and hard; the discharge offensive and peculiar in smell: the urine sometimes bursts out aside from the erosions of the urethra.

OPERATION.

When the penis is to be amputated for a corroding, spreading, or gangrenous ulcer, the operation should, if possible, be delayed till the high excitement and rapid progress of the disease be subdued.

The operation should not be performed if the glands of the groin be diseased in consequence of the state of the penis.

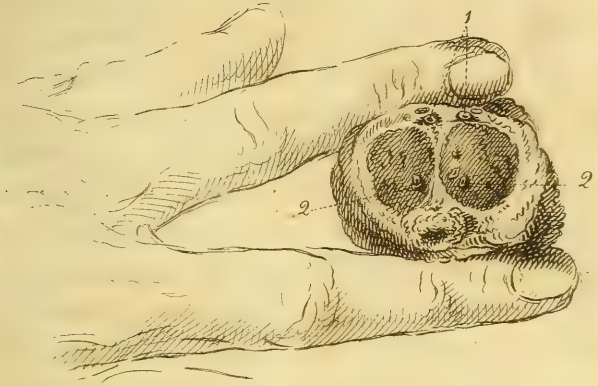
In judging of the plan of our incision, the state of the skin is our guide. We leave no hardness, no

coil of vessels, nor speck which has a resemblance to the disease of the extremity of the penis. The confirmed disease in the skin is shewn by small grains felt under the surface. There is also a state of increased action, which I dread in the neighbourhood of cancerous ulceration, and which is marked by the enlarged pores, and by a greasy exudation. I have not, however, seen this in cancer of the penis.

Stretching the penis, it may be cut off at once, with one stroke of a large scalpel. Two incisions, I believe, will be better; but in doing this we may recollect that we need have no precaution here of saving the skin. The length of the integuments is an inconvenience afterwards.

When the body of the penis is cut through, it shrinks from the assistant's grasp, and is buried among the integuments. It is now that assistance is necessary to the surgeon; for the penis retracted within the skin bleeds powerfully. The assistant must, with his fore and middle finger, push back the integuments, so that the body of the penis may be made to protrude. He should at the same time grasp the body of the penis with his fingers of the other hand, so as to do the office of a tourniquet.

As the time elapses during the operation, the skin becomes more troublesome, and though it appeared that you began your operation within an inch and a half of the glans, the penis will soon have shrunk as it were into the perineum.



The chief vessels to be taken up, are, 1. The dorsal arteries. 2. The next are those two which run near the septum in the spongy body. If these four vessels, branches of the internal pudic, are tied, the patient will not probably be further disturbed with bleeding; but it must be remembered that these arteries and their branches are enlarged in proportion to the size of the tumour and the activity of the disease; and that, as much of the disease is in the prepuce, its arteries (from the dorsalis penis and the middle external pudic) are much enlarged, and may require ligatures *.

Should there take place, after all our care, a bleeding or oozing to any extent, we have it in our

* The practice recommended, of disregarding the bleeding from the arteries of the penis, must have arisen from looking upon these vessels in the natural state of the parts, not surely from experience in practice.

power

power to compress the penis with a bandage, introducing previously a female catheter or silver tube into the urethra. But as the stump contracts very much, I fancy this will sometimes not be very easy. I have never seen it necessary.

The skin is brought together by a single strap across; dry lint is put above this, and a broad band made to come up from betwixt the legs. The only care should be to keep the urethra free below. To do this no contrivance of bougies will be necessary, I believe; but if the integuments are hanging long over the stump, as they have no glandular apparatus for defending them from the urine, they may become very troublesome, from swelling and excoriation.

We may be under the necessity of using the bougie, after the healing of the parts, from the contraction of the extremity of the urethra.

CHAPTER

CHAPTER V.

OPERATIONS ON THE ANUS AND RECTUM.

OF HÆMORRHOIDS, OR TUMOURS IN THE EXTREMITY OF THE GUT.

When we recollect the peculiarities of the circulation of the blood through the liver and intestines, we readily comprehend how a costive habit and indolence of the bowels will produce a degree of remora, and surcharge of the venous system of the intestines; that the effect of this state of the viscera falls on the veins in the extremity of the rectum; that they are the lowest and most depending branch of that system, and in certain circumstances external, and as it were removed from the general support and pressure which is upon all parts contained within the cavities.

We readily acknowledge also their frequent connexion with disease of the liver, and with ascites. But, totally independent of all this, venous tumours form upon the margin of the anus, as mere local dis-

eases, proceeding from the action of the gut*. From irritation in the extremity of the gut, the lax inner coat swells, whilst the muscular fibres, contracting, push it down as they would matter in the gut. At the same time, the action of the muscular fibres constricts the hæmorrhoidal vein above, and the loose cellular coat, which is protruded, is filled with blood. The sphincter, relaxing as the upper portions of the fibres act, a considerable portion of the inner coats of the gut is sometimes inverted, and swelling, it is in some measure strangulated †. These tumours being several times produced, will at last become permanent. They form very generally in two distinct clusters, on the sides of the anus; and in the middle of these there is a prominent and distinguishable point, or somewhat of a distinct tumour, hard, livid, and acutely painful. They produce great distress, tenesmus, difficult and painful evacuation, and frequent discharge of blood. They now consist of the turgid veins of the inner coat or margin of the anus, and the cellular membrane filled

* Or as accidental symptoms proceeding from pregnancy, cold, hanging long on the feet, &c.

† In this case there follows great pain and fever. This is no time for operation. The pain and irritation is such, that a heavy foot pacing across the room produces a paroxysm of pain. Leeches, fomentation, mild laxatives, which operate little on the rectum, astringent and opiate ointments, or with extract of lead, and washes, are to be used. After moving the bowels, and irritation about the anus remains, an opiate clyster will give relief.

with

with lymph or blood, or they have become firm and fleshy.

When the hæmorrhagy is great, we find it recommended to introduce a "tube of silver, wrapt properly round with soft linen," into the rectum, or a sheep's gut! But when we consider the nature of the action of the rectum; that these act as suppositories, and excite the gut; that the action of the rectum is attended with a relaxation of the sphincter, at the same time that the gut itself is in contraction; we shall acknowledge that all this thoughtless ingenuity is misplaced, and must do harm.

With piles there is often combined an inflammation, and tendency to suppuration, in the cellular membrane around the anus, while an accumulation of hardened feces is formed in the great intestines. This distended and inflammatory state of the parts must be allayed by bleeding, laxatives, clysters, and low regimen, while anodyne fomentation and soft cataplasm, are applied externally. Such a state of the parts requires care, as it often lays the foundation of fistula in ano.

When there is an attack of piles, attended with tenesmus, and the frequent contraction of the gut, a dose of a mild laxative should be given; and upon it beginning to operate, a warm anodyne, or the injection of a thin starch clyster, with laudanum, to subdue the irritability of the gut.

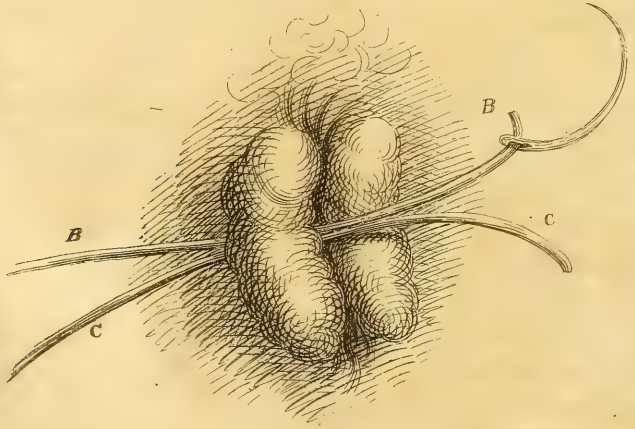
Some surgeons have been in the practice of cutting off the hæmorrhoidal tumours, when they have become permanent, with a pair of scissars, or at least the

the most prominent and painful of them, in consequence of which the others collapse.

This may be done in many instances with ease and success; but still there are objections to the practice. There may follow hæmorrhagy, from opening a vein; and it will be remembered, that from the anus to the sinus of the liver, there are no valves.

The operation is incomplete, unless the whole diseased parts are taken away, and the extremity of the gut consolidated by inflammation. This intention is best fulfilled by the use of the ligature.

As preparatory to this operation, the patient should be put for some time over the steam of warm water, and made to strain, so as to produce the tumours in their full extent.



Supposing that we have to operate on the tumour A, we thrust the common crooked needle through the middle of the base; then cutting out the needle, we separate the two ends of the ligature, B C, and tying the ends C C, under the lowest portion, and B B also, close upon the anus, including the other portion, the tumour is completely strangulated, and drops off in a longer or shorter time, according to the thickness and firmness of its base. If the ligatures are drawn with difficulty to the due degree, and the swelling of the tumour seems to prevent the ligature from drawing the base of the tumour into a narrow neck, the lancet may be thrust into it. This, far from being painful, is a relief*.

In other cases, where the form or magnitude of the tumour is different, we thrust the common hair-lip pin, D, through the base of the tumour, and tie a ligature behind it, embracing the whole base of the tumour.

After tying piles, or the descending inner coat of the rectum, we may look for much pain and irritation in the neck of the bladder, and even such obstruction of urine as may occasion the necessity of using the catheter.

When the tension is very great, and on examination the tumour is much swelled, it is best to run a lancet into it, and tighten the ligature.

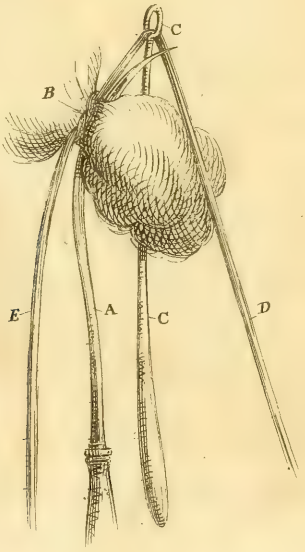
Tumours sometimes form so far within the gut, that it is only in very violent straining and evacua-

* See further, Home on Ulcers, p. 370.

tion

tion that they are pushed down without the anus; and the surgeon has to operate on the base of a tumour situated some inches within the gut. Such tumours of this kind as I have met with, were nearly as soft and as easily bruised as a strawberry; but I know that they are not always so.

Introducing the fore and middle finger of the left hand into the rectum, we grasp the root of the tumour, and betwixt the two fingers we direct the point of the needle used by Sharpe for the extirpation of the tonsils, or any similar instrument, and pierce the root of the tumour. We must now fix upon the point of the needle a bit of cork or wax. The next part of the operation is to put a ligature over the point of the needle (by carrying the double of the ligature on the fore-finger of the right hand), then making the surgeon's knot upon it, draw it tight by means of Sharpe's ring, carried along one of the ligatures.



A, The needle, pushed through the root of the tumour. B, The ligature drawn round the neck of the tumour, by introducing the instrument C, along the ligature D, and by fixing the ligature (turning it over the fore-finger), and pushing the ring into the gut, drawing at the same time, on the other end of the ligature E, the knot is firmly tied, and the needle may be withdrawn.

PROLAPSUS ANI.

The descent of the gut ought to be immediately reduced. If, however, it has been down for some considerable time, the coats become tinged with venous blood, and swell; and it requires leeches and fomentation before the tumour can be reduced.

The patient is to be placed easily on his side in bed, so as to relax the belly. At first we press but gently, endeavouring to reduce the general size of the gut, and then attempt to put it up; and when it is accumulated together, with a cone of paper, made moist and soft at the point, the whole is thrust up, and retained by compressing the nates together.

The treatment consists in relieving the irritation of the rectum, which had occasioned the prolapsus (frequently in children the ascarides) and endeavouring for the time, until the parts have recovered their tone, by astringent washes and internal medicines, to prevent the gut from falling, or rather from

from being pushed down by the action in going to stool. The evacuation must be made in the erect posture, than which I know nothing which more effectually supports the gut.

In children, from irritation in the bowels, we often see the rectum inverted, and hanging down a very great way; but in adults the prolapsus ani is of a different nature. It is the inner coat of the gut, and loose in its connexions with the muscular coat, which, filling with extravasated fluid on going to stool, is pushed down by the same action of the muscular fibre which evacuates the feces. It is often a consequence of piles, of the irritation of the piles, and the frequent evacuations of blood, which relaxes the parts within the anus*. What is wanted is the adhesive inflammation, to give union, and to consolidate the coats of the extremity of the gut. It is in fact the same disease we have been treating of under the head of Piles, and is to be operated upon in the same way. If we were to cut away the folds of the inner coat of the rectum, which are perma-

* For these relaxations of the gut, astringent washes are used, as lime-water, decoction of oak-bark, Port wine, spirits, &c. The patient is recommended to keep the bowels loose by some mild laxative, as the oleum ricini, and to take an injection only before going to stool; to go to stool before going to bed, rather than in the morning, if not very much against his habit, that the parts may be more easily and permanently replaced, or draw themselves up; and when at stool, to keep himself almost in the erect posture.

nently

nently hanging from the anus *, we should not be secure against hæmorrhagy, if the patient goes to stool before the parts are consolidated by inflammation. He bleeds from the extremities of the veins during the effort at stool; and Mr. Hey had to take up with the needle two arteries on the side of the anus, an hour after the operation, in consequence of hæmorrhagy; and the application of the ligature was attended with considerable difficulty. The ligature is the better way of exciting the inflammation necessary, and the safest and least inconvenient method.

OF FISTULA IN ANO.

A FISTULA in ano is a deep imposthumation by the side of the anus. When the matter makes its way through the skin, surgeons have called it an External Fistula; when it has opened into the rectum, it has got the name of Internal or Blind Fistula; and those abscesses which have an opening in the surface, and also communicate internally with the gut, have been

* Two small tumours, or often pendulous flaps, which hang on each side of the anus, and which remain after the greater portion of the gut which had descended on going to stool, is reduced; more rarely there is an entire circle. Mr. Hey speaks of the gut descending, and adhering to the integuments by the side of the anus. This I can imagine to be only the spreading of the root of the tumour to the margin of the anus.

termed

termed Complete Fistula. Often there arise large phlegmonous boils by the side of the anus, which require to be brought forward and opened early. Sometimes a hardness and pain on passing the excrements give sign of disease, which suppurating, gradually softens and bursts, discharging good matter. This may have no connexion with the gut, be superficial, and healthy (as an abscess), and consequently require no operation.

In the cellular membrane by the side of the gut, there is an abscess formed, with callous secreting walls. This abscess opens by a small aperture, externally round, hard, and but little inflamed, appearing almost like the opening of a natural duct. Through this opening, matter and feces are discharged; and upon examination the side of the fistula or sinus is found to have an opening into the gut similar to that in the external skin. This is the perfect state of the disease, if I may use such an expression; but there are many varieties.

Very often abscesses are formed by the side of the anus, which have yet no communication with the rectum; and when the probe does not pass up by the side of the gut, when the finger in ano does not discover the bareness of the coats of the gut by the rubbing of the probe in the abscess, it will be sufficient to lay it freely open, and to use light dressing, and keep the bowels open and the health good. There will be no necessity for cutting the gut, or considering the disease in any other light than as a common abscess. Yet we must confess that, even in the case which has no connexion with the gut, though

though when the matter is discharged the external swelling subsides, and the orifice becomes clean and healthy like—yet it does not close, the matter has to be pressed out, the disease remains offensive and troublesome, and discharges a thin acrid fluid—we have to treat it as a complete fistula.

Abscess of a very bad kind is peculiarly apt to form by the side of the anus, in consumptive people. If the physician gives up his patient into the surgeon's hands, to be cured for fistula, when there is a phthisical cough, the latter may expect little reputation to result from his practice.

Often in reduced or originally bad constitutions, the sore is not of a fistulous form; there is an irregular opening, with loose flabby skin, covering a pale smooth flesh, accompanied neither by inflammation nor discharge. In this case, when the parts are freely cut, they should be dressed with balsamic and stimulating applications.

The origin of this disease may be primarily in the cellular membrane, by the side of the anus, and the sinus works its way by the side of the gut. It may run forward into the perineum, or connect itself with the urethra. In the first and inflammatory state of these sinuses, there not unfrequently arises a difficulty of passing the urine, until the parts have resolved into suppuration, and the matter is evacuated. In general, the disease arises from an irritation in the gut. The sphincter muscle of the extremity of the rectum is very strong—above this, the rectum is dilatable and relaxed. From irritation and irregular habits of the bowels, an ulcera-

tion takes place in the coats of the gut, immediately above the strong contraction of the sphincter muscle. An abscess at the same time, and from the same cause, forms on the outside of the gut, which soon drops down, and points by the side of the anus *.

The disease, when of a local nature, is the happiest, and offers the greatest likelihood of a perfect cure by operation. But there are diseases of the cellular membrane and skin, by the side of the anus, of a very different kind. With fever and restlessness, attended with a hard, full, jarring pulse, there comes a dusky, red, or purple-coloured inflammation, without much tension, or phlegmonous hardness. The matter formed under the skin is small in quantity, and bad; the strength, and spirits, and pulse, sink, and the adipose membrane becomes gangrenous and sloughy †.

Large quantities of matter, and deep sloughs, observes Mr. Pott, are sometimes formed, and great devastation committed on the parts about the rectum, with little or no previous pain, tumour, or inflammation.

The disease is sometimes connected with disease of the sacrum or vertebræ, and is of course out of the reach of the remedy by operation.

When the disease is of the nature of the internal

* I believe the state of the liver should also be taken into consideration in the formation of the prognosis, and perhaps in the treatment.

† See Pott.

or

or blind fistula, these are the marks of its presence. When a hardened stool is passed with difficulty, the feces are streaked with matter; on examining the margin of the anus, a hardness is felt, and on pressure matter passes from the extremity of the gut. When the finger is introduced into the anus, the gut is felt to pit as it were on the diseased side, and the matter being pushed out, the membrane of the gut falls in upon the abscess. The disease has been preceded by general pain, and tumefaction in the extremity of the gut, which suddenly subsided after going to stool, the abscess being evacuated into the rectum.

No sooner has even the merest tyro introduced his finger through the anus, in the complete fistula in ano, and felt the constriction of the orifice, or probed the depth of the sinus opening by the side of the anus, and found it running by the side of the thin coat of the rectum, than he perceives the impossibility of laying open the diseased parts to the bottom by any other form of incision than cutting across the sphincter muscle, relieving this constriction, and making the sinus and lower part of the gut one surface.

The patient is placed with his back to the light, and then made to stoop very low, and to rest his head on a low bed or seat; or he may be put in the position of lithotomy.

We have, in the first place, to examine the course and extent of the sinus, by introducing the probe bent, so as to pursue every labyrinth, should extensive sinuses occur.

A, the finger introduced into the rectum; B, the fistula; C, the probe passed first through the external opening, secondly through the sinus and fistula, and lastly into the gut; D, the rectum.

The operation should be deferred, if there is much irritation and inflammation, and the patient in the mean time be made cool and easy, by repose, mild laxatives, and cataplasms or fomentations to the parts.

Having made ourselves so far acquainted with the sinus or abscess, with a little oil on the fore-finger of the disengaged hand we introduce it into the gut. Now, by moving the point of the probe over that surface of the abscess next to the gut, it is felt by the finger, and will be made to slip into the communication betwixt the gut and cavity of the abscess. We have now to examine whether the disease does not extend further up by the side of the gut than this hole of communication*.

The operation is exceedingly simple in these circumstances. A directory is introduced instead of the probe, from the external orifice through the sinus, until it enter the gut. Along this the probe-pointed bistory is passed, until the point rests upon the finger, when the directory is withdrawn. The finger in the rectum, with the bistory, thus pressed against it, is withdrawn, and the intervening part betwixt the gut and sinus, is thus cut through.

* Previous to the operation, the bowels should be emptied, and brought to an easy state, and the rectum cleared by a clyster.

The patient is placed stooping, with his elbows resting on a chair: or, lying on his back on a table, with his buttocks raised on a pillow, and his legs held asunder.

In

In introducing the knife, there is no necessity that the directory should be previously introduced, for with the point of the bistory groping against the finger in the gut, the communication may be found; and even this communication is of little consequence if we are sure that we lay open the gut to that point, and make our incision extend as far as there is felt a thin membrane, only betwixt the probe and the finger. In this operation I cannot conceive a necessity for any other instruments than the probe-pointed bistory, the probe, and the directory. If, however, the fistula be very deep, and the coats of the intestine be deeper than we can reach, it will be safer to use the wire as is described below.

Sometimes the fistula in ano is by no means so simple as I have described it; but, on the contrary, besides the sinus communicating with the gut, there run callous fistula in the perineum, and towards the hips. These we should endeavour to lay open, and cut off the angles which are formed in the skin by the incisions. When they penetrate and run deep, their mouths must be scarified so as to produce an action on their surface, rousing them to activity; after which we have to endeavour to promote good suppuration and the rising of granulations from the bottom.

But there is a more deplorable case in which the surgeon should take heed, lest he promise what his art cannot accomplish; for, sometimes the lumbar abscess, instead of making its way along the cellular membrane under the peritoneum, and pointing at the top of the thigh, descends by the side of the rectum,

tum, and appears here in the hip. This is, however, happily, a rare occurrence.

When the disease is of the nature of the internal fistula, it is made complete by thrusting the abscess lancet into the hard margin of the anus, the hardness indicating the neighbourhood of the sinus. But it will be better, after ascertaining the nature of the disease, to endeavour to find the opening of the gut, which in this case being the sole opening, is generally free. We may do this by introducing the probe, with about an inch or more of its extremity, bent almost entirely back on itself. The probe is carried flat upon the fore finger; and where the finger feels the inequality or hard margin of the communication, the end of the probe drops into it, and then the probe being drawn, the point appears by the side of the anus; or, with the knife, we can cut upon it. Then the parts being in the state of the perfect fistula, the operation is completed by the probe-pointed bistory being made to follow the probe, and by laying the gut and sinus into one cavity.

If in our examination of the fistula, the intestine feels bare, and the probe is felt distinctly upon the finger, we may thrust the probe through the gut, and proceed as if there had been a communication. Circumstances may occur, as where the patient absolutely refuses to be *cut*, to oblige us to operate by the ligature or leaden wire.

The lead wire is introduced in this way: a small silver canula, with a gentle curve towards the end, is introduced into the fistula, and then the finger being in

in the rectum, we feel for the communication, and introduce the canula into it. An assistant now introduces a considerable length of the wire through the canula, which being felt at the further extremity by the finger in the rectum, it is taken hold of by bending the first joint of the finger, and brought out by the anus. The canula is now withdrawn. We then place a small compress betwixt the anus and the opening of the fistula, and twist the ends of the wire over it. By drawing it tighter from day to day, it makes its way out by ulceration, and the cure is nearly accomplished by the time the wire has cut itself out.

In women there occurs a very severe complaint of the nature of fistula in ano, viz. a communication formed betwixt the rectum and the vagina. This is a disease which probably proceeds from some foreign body lodging in the rectum, or from some injury received in labour. After this has been examined, and all source of irritation removed, for bones and shells have been known to occasion it, I should imagine, that by slight scarification and dressing, it should heal; or, perhaps only by laying open the rectum up to the fistulous communication without laying the rectum and vagina into one; or we pass a seton from the rectum into the vagina, which prevents the lodgement of matter, and stimulates the sore to heal.

I adopt the following method of operating from a case under Mr. Lynn's care, in which the old method of operating for fistula in ano was had recourse to: take a leaden probe, of the form of the common eyed silver

silver probe, and putting into it a strong and well-waxed ligature, introduce it into the rectum, and having the finger in the vagina pass the point of the instrument through the communication. Now the probe must be bent and brought out by the vagina, so as to draw the ligature through. Taking now the ends of the ligature, (the one hanging from the vagina, and the other in the rectum) throw a surgeon's knot upon them, and place a piece of lint in form of a compress, so as to press upon the perineum and to be included in the ligature.

By drawing this knot occasionally in the course of a few days, the gut and vagina are cut through, whilst both the ulcer and the cut fill up as the ligature advances: the compress against the skin makes it the last part of being cut through.

As in the fistula of the urethra, all the callosities in the skin about the anus will go away when the fistula, the occasion of them, is cured.

The fluor albus, a mucous orichorous discharge from the vagina, is the most common female complaint. I mention it here as connected with other complaints, as to be distinguished from purulent discharge. With it, there is severer pains in the back and loins—a failure of strength—a pale yellow countenance. When it is copious, offensive, and acrimonious, the orifice of the womb is probably affected. When the matter flows at intervals—when it appears to burst forth, and again to subside, especially if distinctly purulent, there is some abscess probably connected with the vagina, or on the inside the labium, and the parts should be examined.

If

If there be an abscess connected with the external parts, it ought to be laid open freely, and more active inflammation produced by stimulating dressings.

But there is an inflammation and abscess which forms in the labium an acute disease, and very painful. Here we have only to assuage the pain and inflammation, which brings the suppuration kindly forward. I have found able practitioners averse to opening abscesses—there is rarely, I fancy, any real occasion.

CONTRACTION OF THE RECTUM.

The contraction of the rectum takes place generally about two inches up. The attention is called to the disease by the pain about the anus, and sometimes after burning heat and pain, especially when at stool, but especially by the increasing difficulty of passing the feces, and from the figured stool which is passed. The disease may be long mistaken for hæmorrhoids. Sometimes the tubercles present at the anus, but they have a hardness and resistance which distinguishes them from the varicose tumours. The disease is of the nature of a schirrous hardening, which makes the sides of the gut incapable of their natural degree of dilatation. It presents to the finger firm tuberculated and irregular stricture. However, I have often found the stricture like a muscular girding of the gut. It is always to be palliated, and sometimes cured by the following method: a flat piece

piece of sponge, or, indeed, a piece of sponge of any form, is soaked in strong mucilage, then rolled up into the form of a bougie, and tied firmly with a cord: the cord should be oiled. When the sponge is dry, and fixed in its form, the cord is taken off, and it may then be rolled betwixt plates, and polished, and made smooth, and a little conical: a string is tied to the greater end. This is a *tent* which when introduced into the stricture in the rectum, will imbibe the heat and moisture, and gradually distend the contracted portion of the gut. When prepared for use, it is to be oiled, or imbued with mucilage *. Having prepared these tents of various sizes, the surgeon will find that his chief difficulty is in the first introduction of the lesser one; and that even the first will smooth the tubercles and make a passage, and each succeeding one will make way for one of greater diameter to follow. Very often the first tent both considerably enlarges the passage, and acting as a suppository, procures a considerable discharge of feces, or allows the pipe of the injecting syringe to be passed.

During these operations which remove the contraction and the hardness by pressure, calomel should, I think, be given occasionally in small doses, and purged off once or twice a week.

The stricture is sometimes so high in the gut, that bougies or candles must be used to dilate it—some-

* These sponges may be prepared by dipping them in wax.

times

times it will resist this means—sometimes the ulceration and tenderness will not allow of this operation—sometimes it is distinctly cancerous.

Wherever in obstinate constipation in the bowels there is pain towards the left loins and sacrum, the rectum should be sounded with the soft bougie or taper.

In the subjoined plate, a stricture of the rectum is represented, and an ulcer of the gut immediately above the stricture is seen to be the effect of it, on the same principle that the urethra ulcerates within the stricture. In this instance, the ulcer of the rectum was followed by an extensive abscess by the side of the gut and anus.

CONCRETIONS IN THE RECTUM.

Let us beware, however, of mistaking the symptoms of mere concretions in the great intestines, for the more terrible disease of schirrous contraction of the rectum. It has happened repeatedly, that after a patient has been teased with medicines to check a diarrhœa, or has suffered under the conviction of a fatal disease, a well-informed surgeon or apothecary has discovered the complaints to arise from mere hardened feces, or from balls of alvine concretion*.

* Because, in the ball stool, the feces collected in the lower part of the colon, or in the rectum, allow only the liquid contents of the bowels to pass. The rectum is sounded with a wax taper or a large bougie.

When

When such concretions have formed in the caput coli, or in the arch, or (as happens perhaps more frequently) in the sigmoid flexure of the colon, they sometimes, after painful motions of the bowels, are moved from their original situation, and present just above the sphincter ani, being discovered there they have been extracted by the lithotomy forceps of the largest size.

The concretion may not, however, descend entirely into the rectum; but, lodging in the last turn of the colon, it may double down and press upon the rectum, so as effectually to obstruct the bowels, and yet be within reach of a long flexible injection pipe*.

PRETERNATURAL ANUS.

The preternatural or artificial anus is a fistulous opening on the belly, communicating with the intestine. It is produced most frequently by the sloughing of a herniary tumour, or by wounds penetrating the belly, and wounding the intestines; or in consequence of inflammation and adhesion of the intestines to the walls of the belly, and following that, an abscess which bursts through the integuments. We shall not speak here of the circumstances which give a peculiarity to the case of hernia. The wound of the belly opening the peritoneal cavity, though

* See a case by Mr. Hey, p. 494.

the

the instrument has not wounded the intestine, will sometimes be followed by an evacuation of feces, and a kind of anus in the place. It happens thus—The cut is united by one or two ligatures; but it does not adhere, and from the swelling of the lips, the ligatures have to be cut out: the intestine is then seen behind the incision, and adhering round the inner margin of the wound; but it is black and unhealthy where it presents. Here a slough forms, and being cast off, the feces escape by the wound, and a very troublesome fistula succeeds. If the integuments and bowels are both wounded, the process is very nearly the same, if the patient is not destroyed by the first rising of the inflammation, or if the intestines are not excited to pour out their contents into the general cavity; for the neighbouring intestines cohere, and are massed together, while that portion which is next the wound of the integuments throws out its contents by the wound.

But a case which I have frequently seen is less accountable. It is a fistulous opening which is the consequence of a severe attack of colic apparently, and when the general uneasiness subsiding leaves a fixed pain in some part of the belly, with a hardness and partial swelling, to be distinguished by the feel, and painful on pressure. This first attack is followed by an occasional recurrence. At last, an inflamed tumour of the integuments rises, and bursting, discharges pus. By and by feculent matter passes, and a preternatural anus is formed. This, however, is not a direct communication with the intestine. The probe passes in all possible directions. The inflammation

flammation and suppuration preceding the progress of the feces, has made passages betwixt the muscles or their tendons; consequently in this case the discharge is less in quantity, the fluids do not entirely forsake the tract of the canal. Still any irregularity of diet brings on the pain and distention of the belly, with suppressed discharge.

The preternatural anus has this evil consequence —about the rectum there are muscles which support the coats of the gut, and draw it up when the feces are excluded; but here there being no sphincter or levator, the inner coats of the intestine are everted, and form a painful and irregular tumour; and sometimes there is a prolapsus of the intestines, which is in danger of strangulation, like a hernia. The feces, too, having no receptacle, are discharged in their regular course downwards. Further, if this opening continues long, and discharges freely, it has this bad consequence, that the lower part of the intestine being no longer excited by the presence of the feces, it contracts, and suffers violent spasms when we attempt to plug the opening, and force the aliment to take its proper rout. All this absorbing surface, too, is lost to the system, and debility and inanition is the consequence, if the opening into the intestine be high in the canal.

In this complaint we may palliate matters, by using such circular compresses as restrain the tumour of the inner coats of the intestine, and which may at the same time allow the feces to pass, and by adapting vessels to receive the discharge. The cure is to be attempted by compressing the fistulous orifice. This

This must be gradually and perseveringly pursued, desisting when the distention and pain of the belly is considerable, but again renewing our endeavours when it has subsided. The idea is surely correct, that we must make a free passage through the canal, before we need attempt to close the artificial anus. As in fistula of the urethra, we must make good the passage for the urine along the canal, before we hope for the closing of the sore in the perineum. The case may occur where there is an old wound discharging the aliment from a place high in the canal; and yet it may be possible to direct a tube into the lower portion of the gut, so as to throw in nutritious fluids into the lower portion of the intestine. If this be possible, it must be cautiously done, lest we raise an inordinate action in that part of the canal which has been unaccustomed to the stimulus of aliment. *See further under the head of Hernia.*

CHAPTER

CHAPTER VI.

OPERATIONS ON THE FEMALE PARTS.

OF THE FEMALE CATHETER.

The use of the female catheter requires more delicacy, but less knowledge than is required for the obstructions in the male. The patient lies in bed, with the thighs raised, so that the feet rest on the soles as in standing. The surgeon has a basin placed before the woman, or what is better, a bladder is tied to the mouth of the catheter, that it may receive the urine. The surgeon holds the catheter nearly as he would do his writing pen, only that the point of the middle finger is beyond the end of the catheter.

The clitoris is the guide to the surgeon. Separating the labiæ, he feels the prominence of the clitoris. He then moves his finger directly down from it; and on the margin of the vagina (in women who have born children, within the vagina) he is

sensible of a little eminence, or firm ring, on the entrance of the urethra. He has now only to move the extremity of the catheter off the end of the finger into the urethra.

By directing the catheter horizontally, it will enter the bladder, if the obstruction has only been a want of consent in the muscular fibres of the bladder. But if there is a mechanical obstruction, as of a tumour of the ovarium, or the womb, in the early months of pregnancy, or the child's head during labour, we have to recollect that the catheter must be carried in a direction upwards, so as to pass along the back of the os pubis. This direction of the point of the catheter is given by depressing the hand towards the perineum *.

The nymphæ are often enlarged, and projecting beyond the labiæ, by friction they become highly inflamed, or grow hard and callous.

The clitoris is also subject to enlargement and excoriation from its projecting under the labiæ.

Women are anxious to get quit of these unnatural enlargements. The knife or ligature is better than escharotic applications. When the nymphæ have been cut off with the knife, very alarming hemorrhagy has been the consequence. Where the case will admit it, I think the ligature is to be preferred to

* See the anatomy of the parts, in the fourth volume of the Anatomy.

the

the use of the knife. If the knife be used, then must we be on our guard against the return of the hemorrhagy; for these being spongy and vascular parts, they may bleed until the patient faints, and so as to affect the health, though not to be fatal. By dossils of lint, and styptics, with the T bandage, we shall probably be able to command the hæmorrhagy. But supposing that the patient has already lost much blood, and that we are particularly anxious that during the night the bleeding should not return, we may use the common sewing needle, as I have described in the introduction. In the amputation of the clitoris, if it is much enlarged, a vessel or two may require to be taken up with the tenaculum. Here, however, under the arch of the pubes, we have a better opportunity of applying a compress than in the bleeding from the nymphæ.

IMPERFORATED VAGINA.

It is not uncommon to find the vagina closed by the membrane of the hymen. When I have seen it, the labiæ, the clitoris, and orifice of the urethra, were natural; but betwixt the base of the nymphæ, there was a smooth, dense membrane extended, concealing all accurate mark of the proper beginning of the vagina. When this malconformation has not been noticed, at an early period, it is apt to be unsuspected until the period of puberty. When it has opposed the menstrual blood, the cause of the dis-

tress has often remained unknown, while the girl has been enduring many illnesses which might have been easily relieved. About the usual time, the symptoms appearing which precede the flow of the menses, as headach, sickness, languor, dull, heavy, tensive pains, and weakness and pain of the back and loins, in the order of nature they are not relieved, or if the general state of the system be relieved by the action of the uterine vessels, yet the blood is accumulated in the vagina, and more local suffering succeeds to the general complaints. It has happened that the blood of two or three periods have been accumulated in the vagina, before the nature of the complaint has been discovered.

The hymen is discovered entire; the dark blood shines through it; a small opening, by a crucial incision, is to be made into it—when the inspissated chocolate-coloured blood flows out.

But when the imperforated vagina is to be opened in an infant, it is an operation of more delicacy. We guard the urethra by introducing a probe into it; and beginning a little below the orifice of the urethra, we scratch rather than cut with the point of the lancet, until we have opened the passage. If there is not a mere membrane closing the orifice, but something like a deficiency of the lower part of the vagina, we ought to wait for riper years.

In children, an adhesion of the labiæ sometimes takes place in consequence of uncleanliness, and the scalding of the urine. For this the knife is seldom necessary,

necessary; at least if the adhesion be recent, the labiæ may be forcibly separated.

After this separation, or in any state of excoriation which threatens adhesion, a piece of soft lint, dipped in oil, or with mild dressing, must be introduced.

Natural contractions in the vagina, which do sometimes occur, are to be partly cured by sponge-tent. If pregnancy has taken place in this contracted state of the parts, they will soften and dilate as labour approaches, and require no further operation.

OF THE PROLAPSUS OF THE WOMB, AND OF THE USE OF PESSARIES.

The prolapsus of the womb is when the vagina having become relaxed, the uterus falls down into it, so that the orifice of the uterus is in the orifice of the vagina or vulva.

When this has existed for some time, an effort of the muscles compressing the viscera of the belly, or the relaxation of the orifice of the vagina, will make the uterus descend out of the vulva, which is called PROCIDENTIA UTERI. Of the many causes which are made to produce this disease, I can admit none but as they directly produce relaxation in the vagina, among which all weakening discharges must be reckoned. Unfortunately, the means used to relieve this complaint,

complaint, and keep the womb supported, directly increase the relaxation of the vagina.

The vagina and orifice of the womb being exposed, there being a constriction from the orifice of the vagina (now the upper part of it), the prolapsed parts become sometimes inflamed and swelled*. But in general the womb is easily reduced, and too easily falls down again.

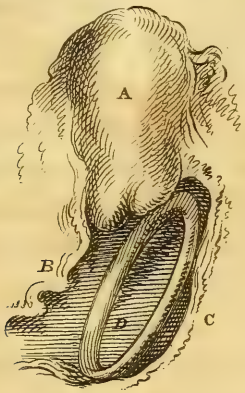
Even while yet the womb remains in the vagina, it will in a certain degree interrupt the passage of the feces in the rectum, and often produce an obstruction of the urine. It is preceded and attended with increased mucous discharge, weary, gravitating pain about the back and loins, and uneasiness about the hips.

If the complaint be recent, we may only insinuate a piece of soft sponge, soaked in an astringent fluid, into the orifice of the vagina, and support it with a compress of linen and the T bandage; and keeping the patient much in the horizontal position, the parts may recover their firmness. If the relaxation be of long standing, and prolapsus confirmed, confinement will but increase the inconveniences of the disease. Then the pessary is used.

* When these parts are thus inflamed and swelled, the patient must be confined to the sofa or bed. They should have applied to them emollient fomentations; and laxatives (more rarely bleeding) will be required. After this we again try reduction. When the womb is reduced, astringent injections and washes will take the place of emollient fomentations.

The

The pessary is an instrument to be introduced into the vagina, so as to distend or stretch it, and consequently support the womb. They are made of the lightest wood, or of cork. The globular pessary I conceive is to be preferred. The bag of elastic gum, or a hollow ball of wood or of cork, introduced with some difficulty through the orifice of the vagina, do not fall out again, but remain distending it, and of course elevating the womb. But there is a necessity for adapting the pessary for married women living with their husbands. For this reason the ring pessary is contrived.



The oval or circular ring-pessary is to be thus introduced—A, the uterus which at the same time that it falls down pitches backward. B, the fore-part of the vagina, C, the back part of the vagina stretched by the ring. D, the pessary, which being oiled, is introduced with its larger diameter foreward and backward, then turned so as to be placed up along

the back of the vagina, resting on the perineum, and elevating the orifice of the womb.

If not carefully managed, the pessary will press upon the urethra and neck of the bladder, get across the vagina, and receive the os tincæ into the ring, or press unequally, and cause ulceration.

OF POLYPUS IN THE VAGINA.

The polypous tumor in the vagina proceeds from the uterus. There are exceptions, I know. Tumours grow from the vagina itself, and are troublesome or dangerous from their bleeding too: but the more common occurrence is a tumour in the vagina, appended to the uterus. This is a subject of considerable importance. A young surgeon, when he finds a tumour in the vagina, must not immediately think of his operation: there is much to be studied in the symptoms, and some difficulty occurs in ascertaining the nature of the disease, by the finger and probe.

All excitement of the womb is attended with increased vascularity and muscularity. Polypous tumours do not grow without exciting a certain growth in the uterus; and with this enlargement and excited state of the vessels, the periodical discharges are increased, so that the disease is often mistaken for menorrhagia.

A polypus is a disease of slow progress; and it will give distress long before the patient is sensible of

of its nature, and before it becomes perceptible to the feeling. The health is not perfect; there are complaints the effect of uterine irritation; pain or uneasiness, and weakness of the loins; increased mucous discharge; the menses are profuse and irregular, and painful, so that the patient is often greatly reduced. It is considered as a disease of weakness, and medicines or regimen are ineffectually prescribed. When the local disease baffles all such general remedies, many are by ignorance or neglect brought to the lowest state of weakness. Many a poor timid woman dies of this disease, when a very simple operation would give perfect relief.

With the return of hæmorrhagy, there is often a pain and bearing down like labour-pains. In fact, the muscular power of the uterus increases with its excitement; and often it happens that the tumour is suddenly delivered from the womb, and lies in the vagina. By the stricture of the womb, its vessels are made more turgid, and the hæmorrhagy is more profuse. In some rare instances, the polypus thus embraced by the neck of the uterus, has faded, and dropped off.

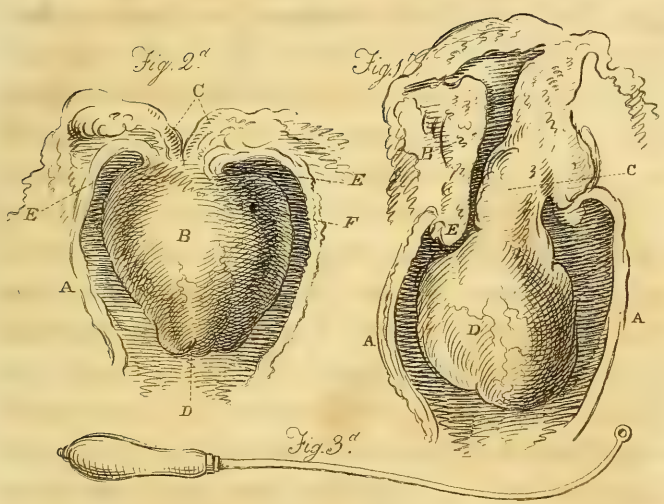
When an examination is obtained, the tumour is felt presenting in the vagina, or pullulating from the orifice of the womb. There is a possibility of a very terrible mistake here. The prolapsus of the womb is a more frequent disease than the polypus; and it must be recollected, that prolapsus and inversio uteri have been mistaken for this disease of polypus, and the womb itself included in the ligature!

I know

I know no distinction in polypus of the womb, but as it proceeds from a disease of the glandular neck and orifice of the womb, or from the substance and body of the womb. In the latter case, the polypus is attended with a more rapid growth, more irritation, and more profuse discharge. It is also more dangerous in its extirpation, and more apt to have incorporated in its substance the proper body of the womb.

When we have felt the tumour filling the vagina, we must first observe the more projecting part, and see if we cannot recognise the orifice of the womb, though distorted, as it often is when there is a procidentia or prolapsus. We must push the fingers to the root of the tumour. If we find that it has a narrow neck, we are safe; if we find that the neck of the tumour is compressed by the orifice of the womb, we are assured that it is a polypus. But if we feel the attachment of the tumour broad, and no proper orifice of the womb, and find that we can neither push the finger nor the probe* beyond the attachment of the neck of the tumour, we must suspect that the tumour has either grown from the substance of the womb, and gradually inverted it, as I have found on dissection; or the tumour being pendulous, it has dragged down the fundus of the womb.

* There is a probe with a little ball on the end, safer and better than the common probe, for ascertaining the form and connexions of internal tumours, as those of the womb and nose.



These plans represent the difference which I have described. In fig. 1. let A represent the vagina; B, the uterus; C, the root of the polypus, attached to the side of the uterus; D, the body of the tumour, filling the vagina. Now, if by the finger we feel the tumour pendulous, and detached all around, and can feel the orifice of the womb at E, we are assured that it is a tumour hanging from within the uterus. And now, by insinuating the ball of the probe into the uterus, we ascertain that the cavity is beyond the neck of the tumour; and perhaps finding

ing that the probe catches against the side of the uterus, when we pass it upon one side of the neck of the tumour, while it passes deeper on the other, we may conclude that the polypus springs from the neck of the uterus.

But in the second figure, we see what has happened: it is no supposition, but taken from a dissection made by my own hands.

A A, is the vagina; B, is an immense tumour, filling the vagina at D. There is no orifice; it is not a descent of the womb in the common acceptation of the term; yet at E, there is no passage for the probe; the finger can feel no orifice. We may conclude from the examination, therefore, that this is no polypus for extirpation, and that if the ligature was to be put about the tumour at E E, the substance of the uterus itself must be embraced by it.

What did the dissection here teach me?—First, Upon looking down into the pelvis, I saw the Fallopean tubes C, and the ligaments, as if sucked into the body of the uterus. But that which seemed the uterus was in fact the vagina, into which the uterus was pulled, and enlarging there, had distended, and raised it up. Upon examining this tumour, and making a cut into it, it was evidently the uterus itself; for the Fallopian tube opened at F, upon the surface of the tumour.

Now, had the ligature been applied upon this tumour, and it had every feeling of a common tumour of the polypous kind, the uterus itself would have

have been mortified and cut off by the operation, and the patient would have certainly died *.

We must never forget, that by the rude examination of the polypus, the surface may be torn, and a very terrible hæmorrhagy be the consequence, to so a great a degree, indeed, as to prove fatal if the patient has been much reduced previously by similar discharges.

If, however, we have ascertained that the disease is polypus, we can immediately suppress it, by applying the ligature.

The only instruments necessary in this operation will be, a strong ring, of that kind used for tying a cord about the tumour, within the rectum, and two instruments of the kind, delineated in fig. 3.

Fig. 3.

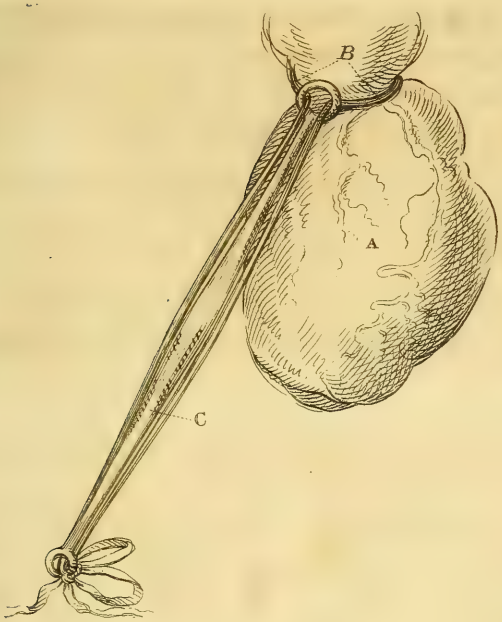
having a small ring which opens with some elasticity; so that being run along the cord which ties

* It has occurred that the uterus has been, in mistake, cut off, and the woman has survived; but there are many proofs of the fatal effects of this mistake.

the

the tumour, it may direct it deep, and slip off from it when necessary. Placing the patient on her side, or on her back, we take a small firm cord, and without making a noose upon it, we spread the doubling of it upon the extremities of the fingers: insinuating the fingers conically into the os externum, when they touch the lower part of the tumour, expand them, and as it were grasp the tumour, carrying the cord round it at the same time upon the points of the fingers; then pushing the fingers as deep as possible, leave the ligature and withdraw the hand.

But the ligature may still be far from being home to the neck of the tumour, we have now to take one of these curved instruments, having a ring in the end, and carry it along the ligature, and direct it to the very base of the tumour within the uterus: then with the other ringed instrument embrace both ends of the ligature, and run it home along them, until the instrument is brought up close to that first introduced, which is now withdrawn. We may now tie the cord in the common method, holding one of the ends (put through the ring, and the instrument pushed beyond the knot to be tied). Or it may be more easily done in this way:



A, the tumour; B, the ligature round the neck of the tumour; C, the instrument, being a piece of steel, with a ring at each end—the one is put on both ends of the ligature, and pushed up to the neck of the tumour, so as to tighten the cord B; then the ligature is put through the nearer ring, and tied firmly at D.

This is simple and effectual. The ligature ought to be drawn only so tight as to stop the circulation. If too slightly drawn, by only strangulating the veins, it will produce or increase the hæmorrhagy, if the surface has been injured; but when it is sufficiently tightly drawn, the bleeding will cease; on

the next day the cord will be drawn a very little tighter; and each succeeding day the tightness should be increased; and between the third and the sixth day, the ligature comes away, having cut through the neck of the tumour.

If, during this operation, much pain and sickness follows, we must be particularly cautious; and if in the course of it there arises pain and tension of the belly, we immediately desist, and by fomentation and bleeding, allay this rising inflammation.

CHAPTER VII.

OF THE OPERATION FOR CANCEROUS BREAST.

The mamma is a gland almost peculiar in this, that it has not a continued action and secretion. Whilst other glands continue their function uninterruptedly, this depends upon the state of the womb: its action by remote sympathies, is at one time called forth, and again left for an interval to subside; and, finally, at the age of from forty to fifty, its function is intirely suppressed. Were we to take the instances of the womb and breasts, we should say that a cessation of accustomed action were ill to bear; and that the part exposed to it is apt to fall into cancer.

The perfect reliance which, within the last thirty years has been placed on the excision of the mamma, for the intire extirpation of the cancer, is in the present day considerably diminished. And in the late publication of Mr. Home, on cancer, the opinion of the older professor Munro, published in the Edinburgh Medical Essays, is confirmed, that after an

operation performed too late, the disease is aggravated, or runs a more rapid course than it otherwise would have done. Perhaps the explanation of this is, that where parts are left unextirpated, which have a tendency or disposition to the disease, the operation acts as a blow would do, or any other violent cause of increased action or inflammation, fostering and bringing forward the disease*. Often, I believe, the gland is like the tuberculated state of the lungs, an occasional excitement is only wanting to give vigour to the latent disease. This kind of reasoning would deter me from extirpating tumours situated in the substance of the gland, leaving the gland itself behind. The tumour must be very free and insulated, and superficial, which I would cut out without taking the breast along with it: for when such tumours have followed from blows, or kicks of the child, is there not reason to fear that a similar effect may follow to other parts of the breast, in consequence of cutting, bruising with the fingers, and tying ligatures on the glandular substance?

One of two things is proved by every day's experience, that either the disease apparent in one part is a mark and sign of some general pre-disposition in

* The cancerous action is unlike in its progress to that of the common inflammations, which spread more quickly along the surface from cell to cell. It consolidates as it advances, and I conceive that the condensation of the cellular membrane by the inflammation which follows the operation, affords a more easy progress to the course of the cancerous action.

the

the surrounding parts, or the contamination from the centre of disease precedes all evidence of the commencement of diseased action in the surrounding parts.

The disease generally begins at the period of the cessation of the menses. About that period the menses flow irregularly; sometimes intermit, and sometimes are accompanied with an unusual flooding. It is the same unequal action in the breast, which brings so many women to the surgeon, with swellings, and powerful stinging, and throbbing*. This being neglected, the breast becomes indurated, irregular, and knobby; or, the general swelling subsiding, there is left a firm body in some part of the gland, the origin and centre of all the future mischief.

Sometimes the disease arises in a distinct tumour, as frequently a small portion of the gland becomes

* If there be swelling and tension of the breast, and throbbing pain, as of inflammation, then I would give a pretty smart purge, repeated more gently within the week, and afterwards continue with small doses of calomel. Bleed with leeches, repeatedly at intervals, and then apply a vinegar poultice, (or the aq. ammon. acct.) or in a duller and less active state of the gland, I would, after leeching or cupping, foment, and repeating this, anoint with camphor and mercurial unction, or camphorated spirit. Some use the hemlock poultice. But in short, our endeavour should be, after lowering and keeping down the general action of the gland, to excite the surface to action, and still more to relieve the glandular body.

diseased, having a knotty, but not a circumscribed feeling.

When a purple colour is on the skin over the tumour, accompanied with shooting pains, it is a very unpropitious beginning. The operation should not be long delayed.

The worst cancer begins by a small hard tumour within the breast, with frequent stinging or lancing pains; the skin becomes attached to the tumour; assumes a livid colour, with enlarged veins; and is drawn down to the centre of the disease. If the operation were to be performed only in such cases, its reputation would have a very rapid decline: for a small irregular breast, with the nipple drawn in, and with stinging pain running towards the axilla, betokens the worst kind of cancer*.

There is a very different disease to appearance, which very often, I think, presents to us, a large stoney irregular tumour of the breast, standing directly out, and not much attached, a most glorious occasion for a seemingly dextrous public operation of cancer! This tumour is very easily turned off; whilst that described in the last paragraph, is very apt to adhere to the pectoral muscle, the fat is much absorbed, and the integuments thin.

* Scrofulous are softer and less heavy than schirrous tumours: the ulcer is not so irregular, the edge is not everted and curling, and the skin is less drawn in and puckered. I am afraid it is sometimes impossible to distinguish the schirrous and malignant tumour, from the scrofulous enlargement.

Sometimes

Sometimes cancer arises in the glands of the areola and nipple, and forming first extensive excoriation, fungous excrescences are next sent up. The whole breast at the same time swells, and becomes elastic, whilst the fungous tumours sink their roots deep, and the disease is an open bloody cancer. Whilst these excrescences rise in the centre, the skin around becomes diseased, and then there spreads a spurious kind of ulceration, which throws off the natural cuticle: from this new surface, at intervals, granulations sprout up like those in the centre. Like the other cancerous ulcers it is attended with a severe burning pain. This species of cancer often does not admit of amputation, on account of the extent of the diseased skin at an early period*.

But there is a more common fungus, which arises from the cancerous breast.

Where the central tumour attaches to the skin, an

* When it is impossible to operate in such an instance of the disease, it is very necessary to know how we are to palliate and relieve the symptoms. Oily dressings promote the discharge, and keep the woman uncomfortable to herself, and disagreeable to her neighbours. Washes and wet cloths will be a great relief. Astringent washes of lime water, acetite of lead, laudanum and rosewater, &c. diminish the discharge, and suppress the general excitement and action, and burning heat of the surface. I have observed, that as the centre fungus enlarged and grew up, it was attended with a great increase of pain, a higher state of vascular action, and more florid ulceration, which has been frequently checked by cutting the excrescences off by ligature, or destroying them by arsenical caustic.

ulcer

ulcer forms with ragged and distorted edges; the skin around is livid, and the veins distinct. From the centre of this ulcer, a fungous tumour rises with rapid growth. This fungous excrescence is soft, and of a dark dirty colour; it is like a dead substance; and, indeed, upon the surface, it sloughs and separates into pelicles. The discharge from the ulcer is thin and fœtid, and there occurs often alarming hæmorrhage.

Whenever the schirrous breast becomes a little irregular, and the nipple is sunk, or as it were drawn in, no time is to be lost: for if with this there is the darting pain, it is a confirmed case of cancer.

When a tumour in the breast feels quite insulated and free, though suspicious, we may with propriety take time to use such means as occur to us to soften and resolve it *. But when it is felt as part of the mamma, and its confines are less distinctly marked, with a shooting stinging pain in it; or when there is a solid heavy tumour, which moves the whole breast, the operation should not be delayed.

When as yet the tumour has given no pain, when the surrounding parts are of a natural looseness, and

* In the treatment of the breast, in whatever state of swelling and inflammation, from the milk breast to the cancerous state, the bandage or sling must not be neglected: it is an immediate relief. Whereas, if the breast hangs, it incessantly solicits increase of action to the parts. The T bandage is to be preferred: first it is made to encircle the body below the breast; and then the middle bandage being split, goes over the shoulders on each side the neck.

sound,

sound, it is considered as not having yet assumed the cancerous action. But when there is pain in the tumour, which is in the breast, especially if the tumour increases in size, and fixes to the surrounding parts, then are the surrounding parts, as well as the tumour, diseased; and, in operating, we should cut as wide of the apparent disease as possible.

We shall often have occasion to say to a patient, "that we are afraid the disease has gone too far, and "that the operation may not only not eradicate the "disease, but may somewhat accelerate its progress. "But if the disease has not advanced so far as we "apprehend, and of this we are by no means com- "petent decidedly to judge, then an operation gives "you safety: and in these circumstances, you must "yourself judge for us."

LYMPHATIC GLANDS.

Long before the breast ulcerates, the lymphatic glands become affected; and, when diseased, their progress is rapid. If the disease of the breast be above the nipple, the glands towards the clavicle are in greatest danger of partaking of the disease: if between the nipple and sternum (which is not frequently the case), then the glands in the intercostal spaces, near the sternum, are to be examined with accuracy; and if the tumour be seated close to the nipple and below it, or between the nipple and the axilla,

axilla, then the glands of the axilla are to be most particularly attended to*.

If the glands in the axilla have occasionally enlarged, and again subsided, it is more favourable than when they have become hard and enlarged by a slow and uniform progress. The glands in both sides should be examined and compared, for often the lymphatic glands are naturally large.

OPERATION.

The patient should be seated on the edge of a strong table, and inclined backwards on pillows, the nurse supporting her head, and a woman before her to prevent her slipping from the table. The surgeon takes his station on the diseased side of the patient.

Instruments—are scalpels, hooks, and three or four tenaculums, the common dressing-case, sponges, lint, compresses, split cloth and broad bandage, adhesive straps, and wine.

The first incisions should include the nipple and areola: these are useless when the breast is away. The first incision should begin near the edge of the pectoral muscle, towards the axilla, and be brought down on the outside of the areola, and in the direction of the fibres of the pectoral muscle, passing with a very slight curve an inch and a half beyond the base of the breast below, or, perhaps, further. This

* See Mr. Home, on cancer.

depends

depends much on the form of the gland: only it is to be remembered, that if the integuments are not fully laid open at first, the surgeon finds it necessary to turn out the skin upon his knuckles with great force, and is very apt to cut through the flap! In taking up the arteries, too, he finds himself poking in a deep sac, from which it is difficult to clear the blood. Beginning the second incision as the first, but deviating at an acute angle from its direction, we come on the inside of the areola, and then again converging to the tract of the first, unite them below.

Our next step is to dissect off two lateral flaps of the integuments from the outer hemisphere of the tumour; in doing which, no vessels of consequence will throw out their blood: and this may be done right and left, without rule.

But in our further dissection, we must previously have determined whether there be disease in the axilla.

If there be no diseased glands in the axilla, we may then begin to dissect out the upper corner of the gland.

As soon as we have penetrated deep, the external mammary artery, which supplies the breast, will probably spring: I conceive that it should be tied now. Proceeding to dissect the gland downwards, we tie such arteries as seem to throw out their blood with force. But if the assistant be dextrous whilst he holds aside the integuments, he grasps these lesser arteries also, or puts his finger upon them, so as to allow the operation to proceed, and the tumour to be taken entirely

tirely away. The assistant then presses a large soft sponge upon the wound, until the surgeon have dried his fingers, and be prepared to take up the bleeding vessels.

If there be disease in the axilla, it will, perhaps, be better to dissect the tumour upwards, tying those vessels with the tenaculum which come from the internal mammary artery, the assistant compressing the others, until the whole mass of disease hangs by the upper corner of the wound. Now, we may either cut it away here, and have the parts free to take up the arteries, if the blood is flowing over the side of the wound profusely; or, continuing the incision upwards, we take away the glands in the axilla, the absorbents with their condensed cellular membrane, and the tumour of the breast, in one string of masses.

In taking the diseased parts thus united, there is, however, no advantage; but I like to see taken away the cellular membrane in the tract from the breast to the diseased glands. Around the absorbents, I have often seen a degree of hardness in the surrounding membrane; and, therefore, I conceive it better, if it be a bad case, to continue the upper part of the incision into the axilla.

When the breast is taken out, we must carefully feel the surrounding cellular membrane, that no hardness or little tubercles be left. The consulting surgeon, also, should convince himself that all is taken away.

We must also examine well the extirpated tumour, and see that there are no surfaces indicating a diseased

diseased part cut through; and part of which, of course, must be left behind. And knowing that the strong white bands intersecting the tumour, form a peculiar character of carcinoma*, we must be satisfied if they are discernible in the tumour, that they are not cut, so that part of them is left.

If we find that the tumour adheres to the pectoral muscle, the fibres of the muscle must be cut, and part taken with the tumour. This is an unpleasant occurrence, as it implies the advanced progress of the disease.

There is no operation in surgery, says Mr. Home, in which secondary bleedings so frequently occur, as in the extirpation of the breast. This often occurs from our leaving the vessels bleeding until the operation be entirely finished; or from the practice I have recommended, that the assistant should place his finger on the orifice, and allow the surgeon to proceed in his operation: for this makes the arteries to bury themselves in the cellular membrane, though large enough to bleed when the woman has recovered from her dread, and is laid warm in bed. But there is no alternative, for if we allow these vessels to bleed and exhaust themselves, as I see recommended during the operation, (besides occasioning hurry during the operation) it produces such a loss of blood and faintness, that many vessels stop and lie concealed, that will certainly bleed after the opera-

* The best account of the appearance of the schirrous, as seen on dissection, is in Mr. Home's book, p. 156.

tion.

tion. When the assistant, therefore, has got his finger on one or two arteries, and a third springs, the surgeon should stop, and all three should be taken up. The surgeon ought to be able to say when an artery throws out its blood, whether it will require the ligature or not; and, if it does, it is better to take it up during the operation: by which means every thing is done deliberately, and the patient's strength is saved.

OF THE CUTTING OUT OF THE GLANDS OF THE AXILLA.

When the glands of the axilla are much enlarged and deep, it is a much more difficult and dangerous operation to take them out, than the excision of the breast.

I have seen a surgeon cut amongst the glands, and then find himself difficulted in conceiving how they had escaped him; or to distinguish which were the glands that he had intended to cut out. Therefore, when these glands are small and loose, but have become very hard, and have not yet condensed the surrounding cellular membrane, I would have the surgeon to examine well previously; then fix them betwixt his fore and middle finger, pressed upon the side of the chest; then cut down upon the glands, and before the fingers of the left hand are raised, put the dissecting hook fairly through them, and pull them out.

But this is a trifling operation compared with the dissection

dissection of the deep indurated and clustered tumour of the axillary glands. In this case, the tumour should be dissected to little more than the extent of its outward hemisphere; and then insulated by working with the fingers; then around the stringy shreds and vessels by which it is held a ligature is to be put, and the glands cut off; or, taking hold of this root with a pair of strong forceps, and resisting with the forceps, the tumour is to be pulled away: if this be dextrously done, the tumour does not bleed, and the parts heal very quickly.

It is recommended to use the needle here: to pass a needle and double ligature through the fat and cellular substance, immediately beyond the glands.

In the first volume of the Anatomy, the consequence of the use of the needle in the hands of common surgeons, is exemplified. They may go too deep, and strike it into the nerves, or even into the artery. But of this there will be no danger, if the gland is well insulated by the fingers from the loose cellular membrane, and if the surgeon does not dive wide and at random. I fancy it is when the arteries have been cut across, and have shrunk into the axilla, that the surgeon does mischief in diving for them with the needle.

Though it be unpleasant to use the sponge, yet it is good to know that almost any degree of hæmorrhagy, but what proceeds from the axillary artery itself, may be suppressed by the use of the sponge and compress, as described in the Introduction. The arteries may be commanded by placing the arm by the

the side, after the compress is put into the arm-pit, and bandaging it down well.

If there be much loss of skin, and the lips meet with much difficulty after the extirpation of the mamma, one or two ligatures may be used with advantage, whilst the arm is bound forward upon the chest, and the head is inclined a little.

But in common cases, and where the integuments meet, ligatures and the needle are out of the question. The adhesive straps, compress, and bandage, are most effectual in retaining the wound together, and in procuring adhesion.

Adhesive straps are useful not only as bringing the parts accurately together, but as a general support to the parts.

The wound should be put together, and a compress of soft lint held upon it lightly for some time before it is dressed; the patient raised, comforted, and assured that the operation is over: she should be made to take a little wine. If there be any arteries of importance untied, they will probably bleed now; and if with this they do not bleed, the dressing will secure her against hæmorrhage from such arteries.

The surgeon, with the towel in his hand, lays the edges of the integuments neatly together, at the same time pressing them to the side of the chest, so as to prevent all oozing under the skin. The ligatures are to be brought out at the extremities of the wound. While the surgeon holds the parts properly in contact, his assistant places the adhesive straps (which should be about an inch in breadth) at

at the distance of quarter of an inch from each other. The strap should be placed on one side of the wound first, and then the surgeon putting it down over the lips with the point of his finger, the assistant fixes it in all its length. The edges of the skin, in this manner, will be prevented from curling in.

After this, lay some strips of soft lint along the edges of the wound, and a large soft compress over the whole. Be attentive in laying the lips of the wound, and keeping the flaps of skin close, and equally pressed to the pectoral muscle. A broad roller of flannel is put about the chest, and the one end of a split cloth being sewed to it behind, the other extremities are brought over the shoulders and fastened to the roller before by pins.

The most unpleasant part of my duty remains, to express my frequent disappointment, and my very moderate expectation of absolute success, and entire eradication of the disease, from this operation, when there has been a confirmed cancer of the breast.

When it is going wrong again, hardness or pimples form on the edge of the incision, and tumour arises in the cicatrix, or in the axilla, or there begins a hardness in the pectoral muscle under the cicatrix, or the glands about the bottom of the neck get diseased. The pulse is slow—the face becomes of a leaden hue, instead of the colour of health, or there is hectic flush—the eye is dull—the lips dry—there are pains over the body—and often there is an excruciating

cruciating pain of the loins before death—or the breathing is affected—there is a short cough—or while the general health sinks, the stomach retains no nourishment, and there is incessant sickness and belching.

CHAPTER

CHAPTER VIII.

OF THE HYDROCELE.

In the fourth volume of the Anatomy, I took occasion to explain in general terms the nature of hydrocele. But before proceeding to the operation necessary to be performed for this complaint, I shall as usual, offer a few preliminary remarks on the appearance and marks of the disease.

The hydrocele begins in a tense and general swelling, apparently of the testicle: sometimes succeeding accidental inflammation (as from a blow, or a bruise on a saddle) which has occasionally subsided, and which has been followed by relaxation and weakness. Most generally the patient can give no account of its cause or origin, but that the swelling of the testicle remained small for years, and of late has more rapidly enlarged.

As the swelling enlarges, it rises with somewhat of a pyramidal form, before the vessels of the cord.

This peculiar shape of the distended tunica vaginalis, is not owing to the opening of its original communication with the peritoneum (which soon after the descent of the testicle is obliterated, and degenerates or is changed into the appearance of the common or cellular membrane), but to its being embraced and connected with the cord, by the fibres of the cremaster muscle, and by cellular membrane. To the touch, the tumour generally feels elastic in a slight degree, not solid, though sometimes hard and incompressible. In other cases it is soft and lax.

Towards the back and lower part of the tumour, the more solid resistance points out to us the seat of the testicle.

The hydrocele of the tunica vaginalis is for the most part in a slight degree transparent. To ascertain this, we grasp the scrotum in the hand, and gather the scrotum behind in such a way as to smooth the rugæ; then placing the other hand over the tumour, so as to direct the strong light through it, we may discern a slight degree of transparency. In children, the transparency is particularly clear.

We next examine the state of the spermatic cord. The vessels of the cord will in general be felt distinctly betwixt the top of the tumour and the abdominal ring. When this is the case, we are relieved from the fear of a hernia; and it remains for us only to determine whether it may not be an elastic tumour of the body of the testicle.

When the apex of the hydrocele extends up into the ring, then we must ascertain the nature of the complaint by other tests. 1. By the history. The hernia

hernia begins above, the hydrocele in the bottom of the scrotum, and ascends gradually. This is a circumstance which the patient will be enabled to determine. 2. We may now place the patient on his back, and grasping the tumour, we shall find that position and pressure makes no change upon it. The patient being raised again, is made to cough; and if there is now no impulse upon the tumour, from the convulsive shock given to the general cavity of the belly, there is no likelihood of this being of the nature of hernia.

There is a greater difficulty of distinguishing hydrocele from enlargement of the testicle. I have twice dissected testicles which had been pierced for hydrocele, and found them to consist of a peculiar vascular, dark, and bloody structure, as if consisting chiefly of varicose veins, which distended the coats with an elasticity so like that of a fluid, that knowing the tumour not to be a hydrocele, I could not yet distinguish any peculiarity in the touch and feeling, by which I might in future determine its nature *. A grey pulpy matter is sometimes forced out from the puncture, in what is called the scrofulous testicle.

This disease of the testicle is not described. In schirrus of the testicle there is often water collected betwixt the coats, which may to the unexperienced touch give the feeling of hydrocele. The weight;

* This uncertainty, and the frequency of hydrocele being mistaken for schirrus of the testicle, made Pott puncture the testicle always previous to extirpation.

the pain occasioned by handling it; the slight degree of inequality; the varicose state of the vessels of the surface—distinguish schirrus. And by continuing the pressure of the finger, you will often be able in displacing the water, to feel the enlarged body of the testicle.

Further, it must be recollected, that with hydrocele there is often an enlargement of the testicle, and a thickening of the coats. But sometimes, on the contrary, there is relaxation of the cord and of the coats, and a softness and diminution of the body of the testicle.

There is an observation confirmed by Sir James Earle's extensive practice, which I cannot omit here. "I can positively assert that the apparent schirrhosity which often accompanies hydroceles of long standing, is often nothing more than a thickness of the coats of the testicle, from long distention, and an enlargement of the gland itself from pressure, which being removed, the parts become thinner, softer, and gradually assume nearly their natural state *."

If a hydrocele is burst by accident, no bad effects will follow, unless the testicle itself be injured. It requires no puncture or incision to evacuate the water. An injury of this kind affords no motive for determining upon any operation. On the contrary, it is an improper time to operate.

* A Treatise on the Hydrocele, by Sir James Earle, Preface, p. xlvii.

If

If the scrotum has been punctured before, it may happen (as I have seen) that the testicle is attached to the fore part of the sac, the part formerly punctured, owing to the partial inflammation occasioned by the operation. Wherever I have seen this, I have performed the operation by incision. Had it been done by the trocar, the instrument would have entered the body of the testicle.

The PALLIATIVE CURE, as it is called, is the mere evacuation of the water of the hydrocele, by means of the trocar. But as the evacuation and suspension of the testicle is the whole of this operation, the description of it is of course included in the more perfect cure by injection.

OF THE CURE BY INJECTION.

THE intention of this operation is to excite such a degree of inflammation in the surface of the tunica albuginea, and tunica vaginalis, that being left in contact by the evacuation of the fluid, they may adhere and preclude the possibility of all future exudations.

INSTRUMENTS.

THE apparatus for injecting the hydrocele are, a lancet and probe. Wine and warm water, mixed; three parts of wine to one of water. I have only to notice, that I have found the common bladder preferable to the elastic bag, as much less apt to inject air instead of the fluid.

OPERATION.

The patient should be placed on the side of the bed, with his hips and back so supported that any involuntary start may not have the effect of making him shrink from the puncture. Or let him be placed on a chair, and by pillows be prevented from retreating with a sudden jerk, which may cause the instrument to slip out after puncturing the sac, and oblige the surgeon to defer the latter part of the operation.

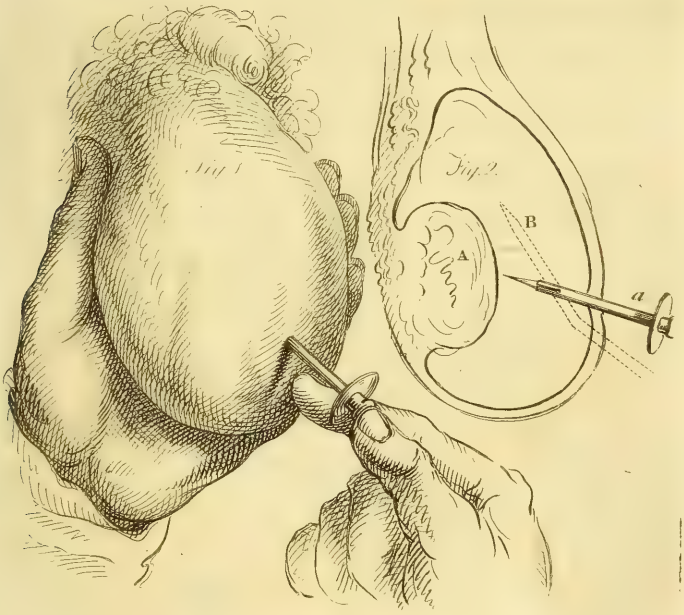
If the tumour be equable and smooth, and the scrotum and coats of the testicle thin, and the nature of the case quite decided, we at once introduce the trocar. If the integuments are strong and thick, and the tumour small, I would advise the surgeon to puncture the scrotum, or rather to make a small incision into it with the point of a lancet, in order to expose the tunica vaginalis; and then to introduce the trocar and canula.

If there be difficulty in the case; if the state of the testicle be suspicious; if the hydrocele be complicated with hernia—then we should cut the scrotum with the point of a lancet, and puncture the sac, introducing a common probe, to facilitate the escape of the fluid, and enable us to examine the testicle by the touch.

In making the puncture, the whole scrotum should be grasped in the hand, and the fore-finger and thumb brought round in such a manner as to grasp the neck or upper part of the tumour, fig. 1. The lower part

part is in this way more distended, and the fore part of the sac removed from the surface of the testicle. You now introduce the trocar and canula (but without plunging it) into the inferior and fore part of the tumour.

This plan, fig. 2, however, will show that we must not pierce directly inward; but having entered the sac, carry the point a little upward in the direction of



the outline B, so as to avoid the surface of the testicle A, and pass into the upper space of the hydrocele.

Further, if, as sometimes happens, the head of the stilette (a) is larger than the canula, it is apt to pierce

pierce with a jerk deeper than the surgeon intended, because it may take some force to pierce the vaginal coat in its thickened state. To avoid this, the instrument may be held as is represented in the first plan, where it is made to rest against the fore-finger, in introducing it; and is moved by the ball of the thumb along the fore-finger, at the same time that it pierces the scrotum.

If the hydrocele is small, and it does not appear that the instrument can be far within the sac (perhaps the canula has just pierced it), then, instead of withdrawing the stilette with a motion of the thumb, the canula is pushed forward further into the sac, whilst the stilette is at the same time withdrawn.

Having withdrawn the stilette, and allowed the water to flow, we have to knead the sac softly, and raise the lower part of it, so as to evacuate the whole.

Here the operation terminates as a palliative remedy.

But if it be intended to inject the hydrocele, we need not be particular in evacuating the last drop. We should rather, in that case, be careful to feel that the extremity of the canula is within the sac, and that it remains there, while we examine the state of the testicle. Though it be somewhat enlarged, this is common to the disease; but if large, hard, irregular, and painful, we may withdraw the canula; for the operation should not be performed in these circumstances.

The assistant ought to bring the injection bag, and support

support it, so that the surgeon have only to turn the nosle of it into the canula, without moving his left hand. He now slowly compresses the bag; fills the sac till it rises nearly to its former size, and turns the stop-cock.

The injection should remain from two minutes and a half to five minutes; unless we are warned by the sensations of the patient to abridge the operation. Severe pain in the cord and loins, with faintness, betrays a degree of sensibility in the membranes, which will be excited to inflammation by a much slighter irritation. The injection is returned much changed in colour, and very turbid.

The most serious accident which can happen from the operation, is the injection of the stimulating fluids into the cellular substance. This is an accident which I have seen very frequently happen, even in the hands of dexterous surgeons *.

I think that I have ascertained in two instances, that this proceeded from the defective form of the instrument. In pressing out the fluid, the end of

* One day while I was accompanying a celebrated surgeon to the house of a patient on whom he was about to perform this operation, I took occasion to remark to him this danger. He said that he could not conceive how it should happen, and that he had performed the operation thirty times without such an accident having occurred. But in perfoming the operation that day the very thing happened: a large proportion of the fluid got into the cellular membrane. I had not therefore to convince him that it was possible, but how it happened.

the

the canula was pressed upon the surface of the testicle, in consequence of which the slit and small hole in the canula which had not passed into the cavity of the sac, giving a passage to the injection, it filled the cellular membrane. On this account, and from the ease with which it enters, and the firmness with which it remains in the vaginal coat, when the stilette has been withdrawn, I have little hesitation in preferring the old circular form of the canula, with the triangular pointed stilette, to any of the more recent inventions.

When the fluid has got into the cellular membrane, I have seen very high inflammation of the scrotum, with fever, and violent pain in the course of the cord, and in the loins, followed by suppuration and bursting of the scrotum, and a dripping discharge of serum, with curdy flakes. This accident may happen in a slight degree to the most expert operator. But he is much to blame if he be not aware of the danger, and if he do not see what is about to happen, and desist in time. Besides, he should puncture the part, and endeavour by gentle pressure to relieve it, and take precautions against the rising inflammation.

But Sir James Earle tells us of a case in which the surgeon had allowed the trocar to slip from the sac, and still continued to force the injection notwithstanding the resistance he felt to its entrance. The consequence was, that he filled the scrotum of both sides! Violent inflammation and mortification, and slough of the scrotum, followed, and left the testicles bare.

The

The marks of the due degree of inflammation having taken place, is a general swelling of the testicle, and a slight redness of the scrotum, on the second and third day. The tumour feels as if the disease had rapidly returned, and the coats had filled with fluid. As the inflammation rises, a pain shoots into the back and loins. Generally to the fifth day the scrotum is swelled and tender *. After this period, the inflammation subsides, the tumour becomes softer, and dissipates, and the testicle is again felt.

In the annexed plate, I have given examples of the total and radical cure for hydrocele, and of the partial adhesion only, and in part the return of the disease. The coats of both these testicles were injected with port wine and water, some years before death. In conversation with Sir James Earle, I found that he had never had an opportunity of demonstrating the nature of the adhesion, though circumstances sufficiently ascertain the fact of adhesion, and the nature and process of the cure.

If an operation for hydrocele has failed, I believe it will be found that the water accumulates in a very short time; and that, on the contrary, if the scrotum continues undistended for three weeks, the cure is confirmed.

After the operation, we confine the patient to his room only. If the inflammation slowly advances, it

* But sometimes free of pain. I have seen it remain swelled a fortnight.

may

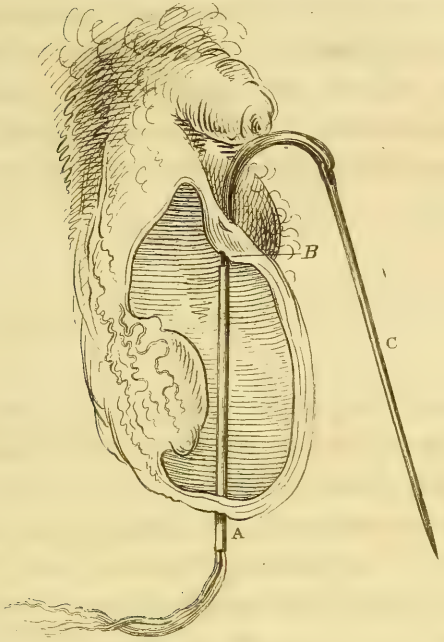
may be promoted by allowing somewhat more freedom in air and diet. If it comes on rapidly, and threatens a greater degree of swelling and pain than necessary, then he must be put to bed, kept on a regimen, and perhaps the parts fomented.

MR. POTT'S OPERATION OF THE SETON.

Before the practice introduced by Sir James Earle, of injecting the hydrocele, the operation of the seton, as performed by Mr. Pott, was a most valuable remedy. It was thus performed.

The vaginal coat was punctured, and the water drawn off. Through the canula of the trocar a smaller and a longer canula was introduced, and the first withdrawn. This second canula was now pushed to the upper part of the empty sac, and held there; and through it a round needle, with a split point, about two inches longer than the canula, was introduced, and pushed out through the integuments, carrying a seton of white silk thread.

In



In fig. 1, the long canula, A, has been introduced through the canula of the trocar, which latter was then withdrawn. The long canula is then introduced to the point B; then the stilette C is introduced, and pushed through the integuments at B, and the seton is drawn through the canula (and of course without rubbing on the surface of the testicle).

On the second day from this operation, the scrotum is swelled and inflamed. The inflammation goes too high, and must often be reduced by fomentation—by laxatives and regimen. When the inflammation has arisen to the due extent, and is decreasing, (viz. about the twelfth day) the threads of the seton are successively withdrawn.

A priori,

A priori, I should have said, that this was the best of all the operations for hydrocele; the neatest, the easiest, and the most manageable. But I have had no experience of it; and modern authority is intirely in favour of the cure by injection.

OF THE OPERATION BY INCISION.

The only apparatus necessary, is a scalpel and bistory, the common pocket-case of instruments, a little lint, and oil.

The patient is seated on a firm table. Bringing him to the edge of the table, you grasp the scrotum behind, making the fore part tense, and beginning near the upper part of the tumour, the knife is drawn to the bottom of the scrotum, cutting the integuments and exposing the vaginal coat, touching the upper part of the incision again with the edge of the knife, until the sac be quite exposed, and the cellular membrane retracted, you puncture it with the knife; and, introducing the fore finger, you run down the bistory or knife, so as to cut the vaginal coat down to the bottom of the scrotum. The finger is as a directory, and at the same time keeps back the testicle from the knife*.

The vessels do not require the ligature. A piece of lint soaked in fine oil is introduced betwixt the

* In some cases, the vas deferens has taken its course on the fore part of the sac.

lips

lips of the wound, and a corner pushed up to the top of the sac, while a slip of dressing, with common cerate, is laid along the edges of the wound.

To the surgeon, the operation is easy; but to the patient severe, when compared to the complaint.

No further dressing is required than a general support to the scrotum.

To talk about removing parts of the sac, when most particularly diseased, or when it has lost its tone! is altogether out of the question. No such thing is necessary, unless the sac be ossified: a specimen of which I have in my collection.

And as to the slipping out of the testicle from the scrotum, in consequence of this operation, I have never seen it, and can hardly imagine it. Nothing but the utmost degree of carelessness can have occasioned any bad consequence from this operation.

The dressings may be removed on the third day. When suppuration is established, the dressing is only insinuated betwixt the lips of the wound. In three weeks, the parts are well.

ical
RARY.

CHAPTER

CHAPTER IX.

OF POLYPUS OF THE NOSE.

There is considerable variety in the nature of the tumours which arise from the membrane of the cavities of the face and nose. Some are harmless; some destructive in consequence of their growth merely, and their forcing themselves amongst the cavities; others are more distinctly cancerous.

The *first* kind of tumour is more of a general tumefaction of the Schneiderian membrane. It has the unpleasant effect only of swelling and fullness of the membrane, as from cold without pain. The colour of these polypi is greyish, like the mucus of the passages: they are quite soft, not painful or malignant in their nature. They swell with every accession of cold, or even with the increased moisture of the atmosphere.

When we operate upon this kind of polypus, though it seem to fill up the passages of the nose intirely; yet, without bringing any thing away, it vanishes

nishes under the forceps, or nothing but a few thin shreds of membrane and blood are brought away. The nostril is cleared, the patient feels relieved, and the air can be drawn through the nostril. But in a few days the disease is just in its former state, and the patient thinks the tumour has fallen forward again; though again grasped at with the forceps, we find nothing betwixt their blades.

This is the kind of polypus in which bougies and medicaments can be of service; because, to raise sufficient inflammation in the membranes, is to destroy this tendency to relaxation. But by mechanical pressure, bougies can do no good. They deceive the patient into a belief and sensation that the passages are freed when they are occasionally withdrawn: but they press unequally on the projecting spongy bones or septum, and destroying the membranes altogether where they press, they may make the bones carious.

By perseveringly pulling away these loose polypi, I have found the tendency to their regeneration checked. I supposed the consequent inflammation changed the tendency of the membrane to disease. The polypi could not in any other sense be said to be eradicated.

The more dangerous polypi of the nose are firmer and more fleshy, of a red or dark colour, and bleed when rudely touched. They are more permanent; less liable to swell and subside by slight colds or vicissitudes of the weather. This polypus I have found, by dissection, arising from all parts of the cavity—from the lower spongy bone—from the ethmoid

bone—from the antrum maxillare. It is a disease common to all the mucous membrane. I do not believe that it can arise from mechanical injury of the parts: the membrane seems, unfortunately, in general, disposed to the disease, when one part has become a large tumour.

These polypi increase in distinct lobes; each tumour hanging from its stalk, consists of many lesser lobes; and these lobes (according to their position and their freedom to expand) enlarge successively, so that, hydra-like, when one head is cut off, which the surgeon conceives to be the whole tumour, in a very short time its place is occupied by another.

This shews how much these tumours are restrained in their growth and expansion, and teaches us the cause of their more terrible consequences: for when they are firm in their nature, and still increasing, they press upon the bones of the face, distort and disfigure the countenance. But worse than this, the same pressure on the bones, destroys the membranes; is attended with a fœtid discharge, as from rotten bones; and makes the soft bones really carious.

Or, again, they produce terrible and frequent hæmorrhagies. For as these tumours shoot backwards by the posterior nostrils, or push from the antrum, their veins are compressed—their arteries continue their action—and the blood flows uninterruptedly from them, until the system is drained. Successive attacks bring on great weakness, and in the end prove fatal.

I have no hesitation in saying, that these polypi

ought to be taken away as well as the looser and more membranous polypi; for in the end, they are fatal by successive bleeding, or by pressing upon and destroying the bones of the face.

If surgeons make no distinction in polypi, they may, I conceive, commit very terrible mistakes. For the looser tumour, the polypus forceps is best; and, by what I have seen of its use, little delicacy is observed in its application, membranes and bones being promiscuously brought away. Nay, some of our London surgeons seem to think they have not done enough until the bones are brought away as a trophy, and a proof that they have gone to the root of the evil, and have eradicated the disease. When this has a good effect, I have already said that I conceive it is by inducing a new action, and bringing on an inflammation, to destroy this unnatural relaxation in the membrane.

But the disease is not in the bones! and it is much easier to bring the bones away than the membranes; and the bringing away of the lower or upper turbinated bone, is no proof of the membrane being brought away, far less of the roots of the tumour being removed. This practice may do well where the tumour is of a soft and membranous nature; but when it is firm and fibrous at the roots, as I have seen it; and when it has run its connexions up among the delicate laminæ of the ethmoid bone, the tearing away of the tumour may be fatal, by breaking up the cribriform plate.

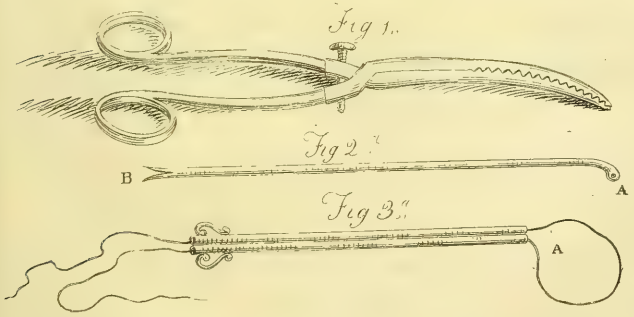
I am unwilling to let this rest on conjecture. The following instance I saw a few years ago, in confir-

mation of the danger of pulling polypi rudely away. It is evident, that a spectator can judge only from the circumstances of the case, and the motions of the surgeon's hand. The polypus forceps were buried three inches in a direction obliquely upwards; nothing was brought away but blood and loose membranes, and bones: the nostrils were, however, cleared. There succeeded to the operation, pain in the face, head-ache, and fever. On the fourth day, the patient became insensible, and died on the sixth day. During dissection, there was observed an effusion of coagulable lymph on the lower surface of the anterior and middle lobes of the brain, and the cribriform plate of the ethmoid bone was away! Now, I do not say that the horizontal plate of the ethmoid bone was torn away by the forceps; but merely judge by the circumstances of the case, that whether there was disease here, and the bones were eroded; or whether the bones taken away during the operation, (as we are constrained unwillingly to call it) consisted of the cribriform plate, as well as the perpendicular plates of the ethmoid bone, there is good reason for us avoiding violence with the forceps directed upwards in the nose.

When a polypous tumour is growing in the nose, let it increase while harmless; whilst it does not press upon the bones to the effect of occasioning a fœtid discharge, or, if not, dangerous from hæmorrhagies, until it becomes pendulous into the fauces, or so as to press forward the *velum palati*. Then it can be noosed with very perfect effect, and with little trouble. But any operation with the wire or ligature,

ligature, before the tumour has become thus pendulous, is very troublesome and precarious: for if the tumour be moved, it is but in part, and before that which is included beyond the ligature has dropt off, other portions will have taken their place. Before this state of pendulous enlargement, the forceps are our only resource.

But some years ago, I found this tearing of the membrane of the nose, productive of pain and hæmorrhagies so great, compared with the advantage gained, that I resolved to persevere in a less painful and troublesome way. I made a slender pair of steel forceps, with teeth to shut close; but the handles I made to separate from the blades, just behind the hinge: with this instrument I grasped the roots of the tumours in the nostrils, and then with a screw, fixed them together, and withdrew the handles, fig. 1.



I freed the nostrils intirely, in a few days, of the polypi, without pain or inconvenience, by merely fixing the instrument one night, and in the following day introducing the handles, and twisting the tumour off, bringing it or its membranes away without

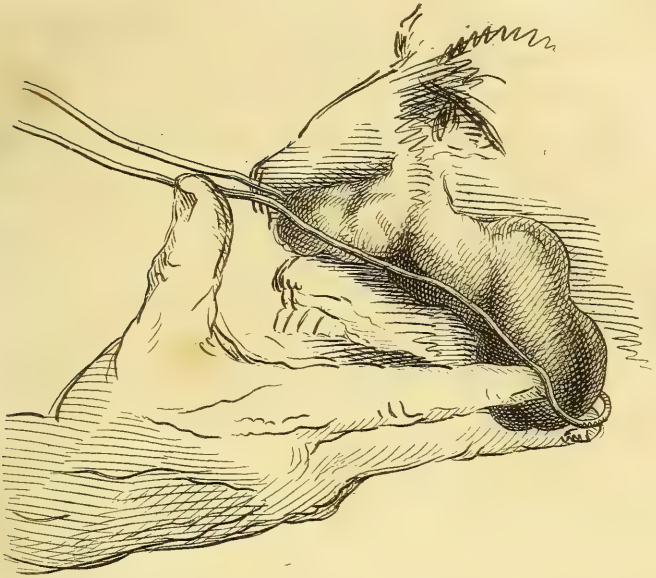
out hæmorrhagy. By persevering in this way, a young woman got entirely well; whereas, had I wrought and twisted the tumours and bones away, hæmorrhagy, a necessity of using plugs, and fœtid discharge would have been the inevitable consequence.

OF TYING THE POLYPI.

The small double canula, fig. 3, is the best instrument; or a single tube may be used; or a strong wire, with a ring at one end. In the country, a blow-pipe, a female catheter, or silver tube of any kind will serve. The noose should be made of silver wire; or silver wire, with catgut twisted round it, as by twisting the tubes, the wire may break.

Having given such a turn to the wire, that when passed along the floor of the nostril, it may turn down behind the velum palati, it is introduced into the nostril of the side diseased; and when it appears in the throat, it is taken hold of by forceps, or a blunt hook, and pulled through into the mouth.

And now the wire, as it passes backward from the nostril, is seen in the throat, and is to be seized, and spread upon the point of the fore and middle fingers of the right hand: then thrusting the wire back into the throat, the fingers are pushed beyond the pendulous tumour, and hooked up behind it; and by gently pulling on the wire with the left hand, the noose is carried quite over the tumour, as I have here represented, and pulled up close to its root.



Now the ends of the wire are put into tubes, and the instrument passed along until it pushes against the fore part of the root of the tumour, and has drawn the noose of the wire or ligature tight around the root. It is then fixed by twisting it about the wings of the nearer end.

If the polypus is large, there is no difficulty; but it is an operation that must be done quickly, while we are about it. The patient's breathing is suspended, and his eyes are pushed out, and the face turgid. There is a kind of dextrous boldness required in the operation. I have seen many surgeons of good experience and sound judgment, fail in it. I have seen the assistant noose a polypus; undo it again; demonstrate how it was to be done by the surgeon, in public. Nothing, however, followed the attempts of the public operator, but spitting and coughing. These advisers and assistants are never to be forgiven.

On

On the second and every succeeding day, the noose is to be drawn tighter, until the root of the tumour being cut through, the instrument comes away. Sometimes the tumour falling into the throat, it is thrown into the mouth. Sometimes it has been swallowed. Often it fades and wastes, and does not fall off like a distinct tumour.

I have seen a foolishly timid surgeon leave the wire bent up against the nostril until it cut it up!

When polypi, of a firm texture, are neglected, and, growing, press into the cells of the nose, they produce dreadful pain, destroy the bones, occasion a fœtid discharge, as in ozæna*, which unavoidably drops

* The carious state of the bones of the nose, produces a state of discharge very offensive and putid, which has got the name of ozæna. (What practitioners take for ozæna, however, is generally an abscess in the maxillary sinus, pouring its matter into the nose.) The bones of the nose are peculiarly weak—they are thin as wafer—have no diploe—and are only supported by the spongy membranes which surround them. Hence it happens, that when the thin bones of the nose are affected with disease, they quickly die, and have no power of renovation, so that they disappear, and what they supported, sinks, never in any way to be elevated again. This bone cannot exfoliate, because it is a simple lamina of bone, and has no vascular internal diploe. When the membranes are diseased, or separated from the bones of the nose, the bone is dead. The pressure of a tumour on the bones of the nose, by destroying their spongy membranes, (their sole support) makes them carious; or, in other words, deadens them; and so in the venereal ulcer the carious and bare state of these bones to the probe, is to be

drops into the fauces, and is swallowed; and this is followed by wasting diarrhœa.

Before the destruction of the bones is completed, the patients often die exhausted by frequent hæmorrhagies, continued pain, and diarrhœa.

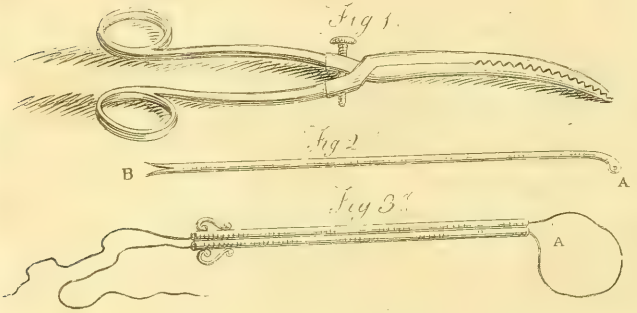
Whilst I say that polypi, which would otherwise be benign, are yet attended with these dangerous consequences, from their mere growth and consequent pressure on the unequal surface of the spongy bones, I do not mean to say that there are not tumours here, or rather diseases of the membrane, of a much more dangerous nature; of a disposition not merely to destroy the bones by pressure, but by an assimilative action to involve them in disease, and to destroy them by ulceration.

These polypi, according to Mr. Pott, begin with pain in the forehead and upper part of the nose—they are painful to the touch—they are hard—and when pressed, produce pain in the corner of the eye and forehead. He speaks also of the adhesion of their pendulous parts, which I really believe never happens. They may have more extensive roots, but do not adhere any where else. I have dissected the

be considered as the first stage of their total decay. They are dead, though not yet separated; and when they separate, it is not by exfoliation, but by totally falling away. When matter flows from the nose, we have to consider the probability of its being from the antrum, or other sinuses; we have to examine the lachrymal passages; we have particularly to inquire for circumstances of former venereal infection; and for other complaints indicative of syphilis in the body.

membrane

membrane of the nose in all stages of disease, from the simple colourless enlargement of the pendulous membranes, to those in which the ethmoid bones were entirely destroyed; and I have never seen an adhesion of the polypus to a contiguous surface. That a cancerous-like disease will follow polypus, and that the polypus will vanish whilst the horrible disease has made its way into the brain itself, I know from dissection. But that Mr. Pott has given the true distinction of the benign and cancerous polypus, I never could admit.



There are some little contrivances in instruments, which almost every surgeon has made for himself. The best, perhaps, are these:

The instrument 2, p. 214, is a simple rod of silver, with an eye at one end, A; and a cleft at the other, B. The cord or wire is doubled, and put through the eye; the ends when drawn tight, are fixed into the cleft.—The double canula, 3, is the instrument used by Levret.

Levret. The noose A, is made by putting the ends of the wire into the canula; and when it is drawn tight, they are fixed about the rings of the instrument.

Still in adapting the noose to the neck of the tumour, an instrument is wanted with which we can take hold of the cord or wire, and direct its application. The instrument 3 (see Polypus of the Womb), is used for this purpose; but the better assistant is a small pair of forceps, which we can very easily manage: they catch hold of the ligature or wire, which still running loose in the points of the forceps, can be directed, and made to encircle the base of the tumour.

Before concluding, I cannot omit the mention of the cases published by Mr. Whateley; and to raise my feeble voice against the practice of cutting the roots of the polypus with a knife, or tearing them away by forceps introduced through the mouth. Far from the success of these cases deterring me from objecting to the practice, it is that which makes me speak of them, since without detracting from the merit of the surgeon, I can express my sense of the impropriety of the practice.

As far as I comprehend the case, it tallies with several which I have seen. I have witnessed also after a series of defeats, the tumour at last noosed by a single motion of the hand. There is no tumour but an osseous one which will resist the right application of the cord, or lace, or wire. As to pain, that ceases with the successful application of the ligature; and

no

no pain of the ligature will outweigh a dozen or twenty unsuccessful attempts with the forceps.

Mr. Whateley attempted to cut through the tumour by casting a cord over it, and drawing the ends of the cord alternately, so as to saw it through. This failed; but I cannot recommend the practice of cutting either with the bistory or the cord. Suppose that the tumour should be half cut through in this way, and any interuption occurs to its completion, the hæmorrhagy will be terrible, and the tumour still hanging in the throat, we can not plug up the nostrils in a way to stem the blood. I must further observe, that I conceive, although the tumour hangs from the posterior nostril, and is seen in the throat. Its roots cannot be seized by the forceps introduced into the mouth.

The tumour has been sometimes so long, that it has hung into the fauces and œsophagus, and has only been occasionally thrown forward into the mouth by the action of vomiting. When this is the case, it is difficult to throw the noose under the lobes of the tumour, without considerable dexterity. The noose must be kept wide expanded in the fauces, and then the patient being made to vomit up the tumour, by the compression of the fauces, it is thrown into the mouth, and of course through the noose: then the cords in the nose being drawn, the noose is brought up to the very root of the tumour.

POLYPUS OF THE EAR.

The usual way of relieving this complaint, is by tearing the tumour away with forceps. This may endanger

endanger the membrane of the tympanum. The better way is to crush and destroy them with small forceps, which are to remain in the passage of the ear until the tumours waste under their pressure. The forceps will be of the kind represented, fig. 4. p. 213.

But when with the probe we can ascertain that these tumours do not extend their roots to the membrane, they may be torn away at once.

CHAPTER

CHAPTER X.

OF THE EXTIRPATION OF THE TESTICLE.

The schirrous enlargement of the testicle, which requires extirpation, makes its attack on the body of the testicle, and spreads and involves the epididymis. It is peculiar in the hardness and the irregularity of the body of the testicle. This, however, is an irregularity which sometimes is not felt, unless we press with some force; for at the same time that the testicle is diseased, there is a degree of hydrocele which fills up the inequalities of the testicle. The disease advancing, the peculiar darting lancing pain of cancer is superadded to that gravitating pain in the thigh and loins, which is the common effect of the enlargement of the testicle.

The stony hardness—the imperceptible growth at first, with the lancing pain, form the most distinguishing character of schirrus. When the scrotum has ulcerated, and a fungus has sprung up, the character of the cancer is announced.

To

To this extent, the progress of the disease may have been very gradual, but now it rapidly advances by contaminating the cord, or fixing on the skin.

We have, as a previous step to any operation, to examine the progress of the disease towards the spermatic cord and the skin. If the cord be irregularly hard, and painful to the touch, the symptom is unfavourable, unless we have room above the diseased part to cut and tie the cord. If it be enlarged, irregular, thick, and painful in its whole extent, the operation should not be performed.

If the scrotum have entered into disease, it is nearly as unfavourable to the success of the operation, as the disease of the cord; for sometimes after amputation, the disease has recurred in the skin; though more commonly it is the cord which propagates the disease.

The INSTRUMENTS necessary for this operation, are scalpels, forceps, tenaculum, a large soft ligature for the cord, lesser ligatures for the artery of the cord and of the scrotum, lint sponges, slips of adhesive plaster, compress, tow, suspensory bandage, or split T bandage.

Having examined the state of the testicle, cord, and scrotum; having determined that you can cut above the disease of the cord; and examined what portion of skin it will be necessary to cut away, if the skin be diseased at all, we proceed thus:

The patient is placed upon a table, with assistants holding aside the thighs. The surgeon sits before him.

There are two ways of doing this most simple operation:

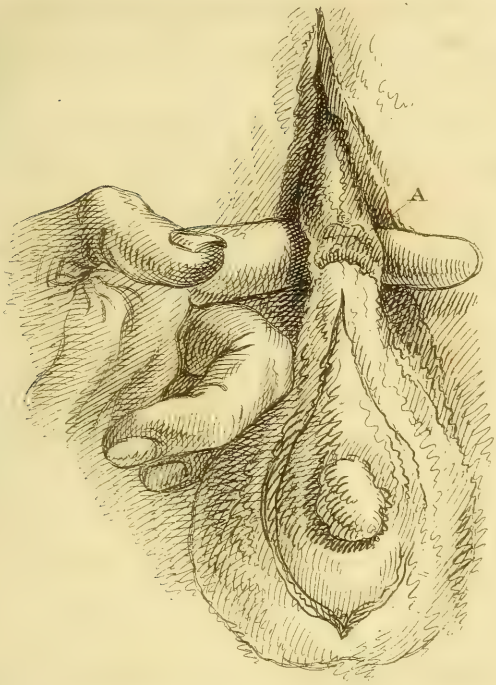
ration : and of the two ways of extirpating the testicle, I must premise that the one I am going to describe, is objected to.

First cut down upon the sound part of the cord, and examine it well; dissect and put aside the cellular membrane altogether, until the free and perfectly distinct tissue of vessels forming the cord, is seen. Above the place where you have laid bare the cord, and in the upper angle of your incision, apply with a needle a large soft ligature under the cord, including the cellular membrane around the cord. There let it remain, but do not tie it.

But if the disease of the cord has reached high—if there seem any risk of a necessity for cutting the cord very close to the ring, then I would pierce, or rather divide the cord with a needle and double ligature, so that if necessary I might tie a ligature on either side of the cord.

Further, we have to recollect that the size of the testicle, the activity of its vessels or its weight, merely may have enlarged the cord considerably; and this enlargement we must learn to distinguish from the progressive attack of the disease, and the contamination of the cord from the disease of the testicle.

We ought besides to observe well any distended cells on the cord, and dissect them; and run the probe to the bottom of them before we cut the cord across. We must also be careful not to cut through a confused mass of condensed cellular membrane; for it may prove to be a herniary sac, and this has actually happened.



Now taking the dissected part of the cord betwixt the finger and thumb, cut it across, as is here represented, but not at once. Cut into it, and as the vessels bleed, take them up with the forceps or tenaculum, on the surface A.

You command the bleeding with your finger and thumb; and, holding up the cut surface of the cord, you pick out the extremity of the artery with the tenaculum or forceps; and the assistant ties a neat small ligature around the artery alone. Then giving freedom to the blood, without letting go the cord, you examine whether the artery of the *vas deferens* be enlarged, so as also to require a ligature;

or whether any other arteries bleed. Having secured all the arteries, the cord is to be entirely cut through.

The incision being made in the whole length of the scrotum, and the cord cut through, the severe part of the operation is done; and now we have only to pull down the cord, and with a free dissection turn out the testicle.

If the testicle has been large, or the common inflammation active, the septum scroti will have adhered to the diseased testicle, and we shall have to cut a great part of it away with the testicle. This, of course, leaves the other testicle free, being connected only by its cellular substance, so that it must be held aside by the assistant, or it will fall from its share of the scrotum.

A considerable artery will sometimes bleed from the loose texture of the septum, and require a ligature.

Objections have been made to the cutting of the cord before the testicle has been dissected. In one case of extirpation of the testicle, "after the operation was completed, and the wound dressed, the patient being seized with a fit of coughing, to the astonishment and dismay of the surgeon, the dressings were forced off by a protrusion of several convolutions of small intestines; from this it was proved that the patient had had a hernia: but the diseased enlargement of the testicle had acted as a truss, and prevented the rupture from coming down."

This

This surgeon must have been remiss in ascertaining the history of the disease*. He must have cut the cord directly through, without examination. If he could not recognise the sac of a hernia, lying before the cord, would he have done it better by dissecting the testicle free in the first place, and afterwards cutting the cord?

But putting aside this objection of the possibility of a hernial sac being in the way, are there not other more cogent objections against this operation? For example, the thickening and disease of the tunica vaginalis, in hydrocele, may have deceived us, and we shall only discover this when we have in effect castrated the man. But is this not equally apt to happen when we dissect the testicle out in the first place? For unless, like Pott, we push a trochar into the substance of the testicle, as a first step of the operation, we shall be no better able to ascertain the disease when the scrotum is dissected

* I venture to say, that there is nothing so truly despicable as the desire (a very common one) of giving a decided opinion off hand, without examining the symptoms and history. The words Pox, Cancer, &c. delivered on the first view of a case, ought never to impose on the young mind, as an indication of superior and almost intuitive knowledge. Had the young surgeon the opportunity of observing the deliberate manner of investigation practised by the present Dr. Monro, a man the best entitled of any I know to give a decided and prompt opinion, he would never be ashamed of the serious investigation of a case, though apparently the most simple.

off, than by feeling the testicle through the integuments.

In regard to the manner which I have recommended of tying the cord, it will be said, that the cord is apt to slip up into the belly. Mr. Benjamin Bell says, that he has seen this twice in his practice, and that the patients died of hæmorrhagy in consequence of it. It must have been a shameful business; and all that can be said is, that it is to be regretted there was no person present capable of giving a good advice. This retraction of the cord is a consequence of letting the weight of the diseased testicle hang upon the cord, so as to pull it down before it is cut. When by cutting off the testicle, this weight is taken away, the cord retracts; we have to take care then (if the cord be then loose, and the testicle hanging) to support the testicle, and allow the cord to retract as far as it will before it is cut. We shall not then see the cord jerk up into the belly on the incision being made.

If, however, we find the cord diseased in such a way that we should be tempted to cut it very near the ring, it is necessary to separate it into two fasciculi, and put the needle, with a double ligature, through betwixt them, before cutting the cord across, lest we should afterwards have difficulty from the retraction of cord within the ring. This ligature may draw down the cord, whilst we secure the mouths of the vessels; or not succeeding in that, we can tie this ligature so as to include the portion of the cord in two distinct knots.

But

But the manner I have described is still a better method by which the testicle itself is made to answer the purpose of this ligature; for instead of cutting the cord through at once, we leave one third of it (not the body of the cord, or chief fasciculus) —and having thus cut the main artery, the weight of the testicle keeps it drawn down until that artery or its branches are secured.

But if this should not be done, and the cord by any accident retract within the ring, death from hæmorrhagy is, I trust, still not inevitable. We may follow the cord with all safety, even to the origin of that muscle, the cremaster, which pulls it up, if we know the course which the cord takes obliquely onward, along the grooves of the lower pillar of the ring.

It will be said that it is difficult to take up the artery separately. I have only to reply, that I have done it, and seen others do it who in other matters had little dexterity. It is with more truth said, that often it will happen that if you take up the individual artery, you will find that there are many mouths.

Mr. Home says, "I have known a surgeon take up the spermatic artery alone, then five or six vessels one by one; and after having kept the time necessary for this purpose, find himself obliged to include the whole cord in a strong ligature, so many other vessels continued to bleed." To me this only proves that in some cases the arteries are numerous, and that after dividing the cord, and seeing many vessels

vessels throw out their blood, we shall be obliged to include the whole cord, or to tie it in two fasciculi. That we can thus do it, after having attempted a milder method, is an additional motive for preferring the ligature of the individual artery.

On the other hand, when we wish to take every possible source of irritation from the extremity of the cord, we, after having divided it, tie a ligature either on the whole cord, or in two divisions. The cord is at this time enlarged and thickened, and the part below the ligature is to slough off. The ligature is apt only to diminish the mass of the cord, and not to cut it through, the consequence of which is, that it hangs about the extremity of it like a ring, whilst the extremity of the cord granulates and enlarges. The drawing of this ligature is attended with severe pain, of the most sickening and subduing nature.

But if we take up the arteries separately, I conceive we should still retain, till the second dressing, the large ligature for the cord lying in the upper part of the wound.

Although I conceive the manner of operating, which I have already described, to be preferable in some respects; that it gives less pain, and is more rapidly done; yet I am not wedded to it, nor do I think it a matter of very essential importance, whether the cord be cut first, or after the dissection of the testicle. It is frequently done in the following manner.

We shall suppose that part of the integuments are

are diseased, or that a fungus has proceeded from the ulcer of the body of the testicle.

The parts being shaved, and the patient seated, the surgeon grasps the testicle with the left hand, so as to make the skin tense on the fore-part of the scrotum. Then, well observing the extent of the diseased skin, he begins his incision A, over the cord,

cord, at that place where, by careful examination, he has found that it is sound. Drawing his knife down, so as to cut through the integuments, he carries it on the outside of the diseased attachment of the skin, as at B; and having encircled the diseased portion of skin, the incision terminates in the bottom of the scrotum, C. Commencing his second cut at E, where he first diverged from the right line, he makes it a counterpart to the last, E D C, so as to include within his incisions the ulcer, fungus, and diseased skin F G.

He now proceeds to dissect back the scrotum upon both sides, and to detach the testicle and its coats from the scrotum all around.

Having done this, and the testicle now hanging by the cord, he may take up such bleeding arteries in the scrotum as seem of sufficient importance to require this; and I have to add, that a little attention and deliberation in taking up these vessels, may save both patient and surgeon from much distress, especially if the integuments have been thick, and the tumour large and of long standing.

Lastly, having the cord betwixt his fingers, and with the before-mentioned precautions, he either ties and cuts the cord, or he cuts it and secures the arteries.

Perhaps it will be found that the adhesive straps lie very ill upon the scrotum; and therefore we bring the lips of the wound together, by two or three stitches. Putting over it a light compress of lint,

lint, and a more elastic covering of tow; the bandage is then brought out, and being pinned to the band round the waste, secures the whole.

OF

OF HERNIA.

CHAPTER I.

INTRODUCTORY VIEW OF THE SUBJECT OF HERNIA.

Definition—Varieties of the Disease—Of Obstructions of the Intestinal Canal, which in their Symptoms resemble Hernia—Of the Cause of Death—Cause of Strangulation—Of Incarceration and irreducible Strangulation.

DEFINITION.

Hernia is the escape of a bowel from the natural boundaries which contain it. When I say the boundaries which contain it, I understand the walls of the abdomen—or of the thorax—or the skull; not the general investing membrane of those cavities, as they are called; for the membrane is carried before the

the protruded bowel, and forms its proper SAC. The bowels in their natural situation are exposed to considerable pressure, and the occasional increase of this pressure is the immediate cause of hernia. The part which has prolapsed, or is protruded, suffers a less degree of general pressure than in its former seat, otherwise indeed it could not have been protruded, nor could we say with propriety that it had escaped.

Further, although after the hernia has come out, it lies in an inelastic membrane and cellular substance, yet this substance yields to the unremitting pressure, and the occasional exertion of the muscular walls of the original cavity. Thus there is a perpetual tendency to an increase in the quantity of the protruded bowel; and also a surcharge of blood in its vessels *.

Our general definition implying that the contents of hernia are enveloped in the membrane of the cavity (as the peritoneum in the abdomen) excludes from consideration under this head the protrusions of the brain, or the disease which is called hernia cerebri; and also the protrusion of the lungs in consequence of wounds in the thorax. It keeps us

* And here we may observe how well Mr. Wilmer of Coventry's practice corresponds with this view, by applying a weight on the herniary tumour, which gently, but with continual pressure, operates to return the contents of the gut into the abdominal portion of the canal. Of this practice, however, I cannot here speak in commendation, not having seen its success in practice.

simply

simply to the consideration of the displacement of the abdominal viscera.

VARIETIES OF HERNIA.

A NATURAL division of herniæ is, into those which are distinguishable by tumour, and those which are concealed.

I. OF HERNIA WITH TUMOUR.

WHEN hernia takes place, through the dilated natural passages of the abdominal muscles and their tendons, the tumour gives indication of its nature and precise seat, and is the subject of surgical operation. The varieties of these tumours are,

I. Hernia through the abdominal ring.—This hernia comes down through the tendons of the muscles, where they split, to allow the passage of the spermatic cord; or in women to admit the passing of the round ligament of the womb.

Varieties:

Inguinal hernia (bubonocele)—when the bowel just protrudes, and lodges in the groin.

Scrotal hernia (oscheocele)—when the bowel descends into the scrotum.

Hernia of the labium pudendi—when the bowels descend in women. A hernia may be

be lodged here which has come down by the side of the vagina *.

Hernia through the ring and through the spermatic process of the peritoneum; being in contact with the testicle, and CONGENITAL, or appearing at birth, or at least with the descent of the testicle.

Hernia into the spermatic passage, behind the tendon of the external oblique muscle.

II. Hernia under the crural ligament, viz. crural or femoral hernia (merocele).

III. Hernia through the ring for the passage of the umbilical vessels, viz. umbilical hernia (exomphalos, omphalocele).

IV. Hernia through any preternatural opening of the muscles of the belly or their tendons, viz. ventral hernia.

II. OF CONCEALED HERNIA.

THIS kind of hernia is without any tumour, or external mark, or possibility of distinguishing the nature of the disease by the touch. We have the following examples.

I. Hernia through preternatural holes in the dia-

* Mr. A. Cooper.

phragm,

phragm, or through the dilated passage for the œsophagus *.

II. Through the hole in the membrane of the thyroid foramen for transmitting the obturator artery and nerve.

III. Before the rectum, and betwixt the process of the peritoneum, which serve as ligaments to the bladder, or to the uterus. This, however, after an unusual descent, may become hernia, with tumour in the perineum, or it may be felt by the finger in the vagina †.

IV. From the openings in the back part of the pelvis, for transmitting the ischiatic nerve (ischiatocele) ‡.

* When any of the viscera of the abdomen are thrust through the diaphragm, they are very apt to be strangulated. The pressure on the viscera in the abdomen is constant. When they are in the cavities of the chest, they suffer alternate compression and relaxation; and during the expansion of the chest, the stomach or intestine, or whatever forms the hernia, is more and more drawn within the hole in the diaphragm, until the breathing is greatly affected, or the bowel strangulated.

† See Denman. It will be protruded by the fulness of the bladder, and recede when it is empty. Mr. A. Cooper.

‡ See Haller's Case.

OBSTRUCTIONS OF THE BOWELS WHICH IN THEIR SYMPTOMS RESEMBLE HERNIA.

In some of the older writers, we read of operations for undoing knots on the intestines, and other internal causes of obstruction. It has even in our day been proposed to cut into the belly of a young gentleman for this laudable purpose; but the good sense and sober judgment of the consultants withstood the ingenuity of the proposer. The mind of the young surgeon is to be put to rest upon this resource of art. The idea arose from mistake and ignorance among the itinerant rupture-doctors, who shewed the ignorant spectators the intestine of a common hernia among their hands *.

These are several causes of obstinate and fatal obstruction of the intestine; but the chief are volvulus, or intus-susception, and the stricture of the intestine

* Saviard, Haller, and M. Hevin (Mem. de l'Acad. de Pruss.) were of this opinion. The operation of Gastrotomy has been more spoken of and recommended by medical writers than by surgeons. We are told that the celebrated Nuck made a dexterous surgeon cut into the belly, and withdraw the volvulus of the intestines. But dissection shews that ere the symptoms will indicate any further malady than a common colic, the volvulus, or intus-susception is past reduction. It cannot be reduced even in the dissected body, after the swelling and accumulation of the internal coats.

consequent

consequent of strings, and partial adhesions among the intestines. There are others, as collection of hardened feces, stricture, and schirrous contractions in the great intestines; but to embrace all these, would lead us from our proper object, and not serve to throw additional light on the subject of strangulated hernia.

SYMPTOMS OF MECHANICAL OBSTRUCTION IN THE INTESTINAL CANAL, AND OF THE ILIAC PASSION.

These are, a sudden attack of great pain in the belly, followed by sickness and obstinate constipation*. The pain often concentrates round the navel; there is a feeling as if a cord were tied there; or there is a tightness or a corded feeling across the upper part of the belly. Sometimes the pain is referable to some fixed part. There arises a flatulent distention of the bowels in some other part of the belly, which rolls with great pain towards this spot; is fixed there for a time, and then recedes gradually. At first the pulse is quick and hard; afterwards more feeble, even thready and quick. With this change on the pulse, the countenance sinks, and gives

* In hernia, or obstruction from any other cause, a stool, from the emptying of the lower portion of the canal, is almost the necessary consequence of the strangulation. That the patient says he had a stool after the accession of the violent symptoms, must not blind us to the other circumstances.

signs of great anxiety. There is general restlessness, hiccup, and fetid eructations. The abdomen becomes tense and painful, and pressure on it is insufferable. There is occasionally relief, and then again an accession of more violent suffering. The hair is wet with perspiration; a cold sweat is on the surface; the pulse becomes weak, thready, and intermitting, and the patient sinks.

Before death the pain subsides; but the anxiety and restlessness are not diminished; or at least the altered countenance denotes to the surgeon the death of the parts, which were painful while sensible. And often the friends are deluded by a vain hope of amendment, to feel more acutely the fatal termination.

SYMPTOMS IN HERNIA.

When these symptoms are combined with a herniary tumour, there is a drawing down of the belly to the seat of the hernia; the tumour becomes quite tense and hard; by and by, it becomes red and painful, even upon slight handling *. The redness will vanish on pressure, and the surface pit slightly by the resting of the fingers.

* Often produced, or at least accelerated, by the attempts to reduce the gut.

OF THE CAUSE OF DEATH.

On this subject, which is certainly of the highest importance, and which must be the foundation of all our rational practice, I will take somewhat more latitude of enquiry than strictly belongs to the systematic form of this book; because I conceive it to be a subject very little understood, though I by no means mean to say that I am about to deliver any new doctrines. I trust the view which I shall give, has occurred to the observation of every man who has pursued the enquiry by dissection: yet it is not laid down in our books.

When we lay open the abdomen of one who has died of ilius, from intus-susception, or internal strangulation, or from hernia, this is the state of the parts. A few turns of the intestine occupies the whole belly, as it were, and they have pushed back and hid the part of the canal that was below the obstruction. These distended intestines are full of flatus; are of a very high colour, and greatly inflamed in some places, approaching to gangrene. The colour of these intestines is a dark brown; sometimes a dark purple, with spots of a more lurid lake colour, where the turgid vessels are more numerous. On the surface of these intestines, pus lies and flakes of coagulable lymph. The peritoneum is dark and full of vessels, but not in an equal degree with the distended intestines. There is a peculiar fetid odour. When the dissector turns away the violently distended and high-

high-coloured intestines, he will discover others in a very different state, small, compressed, and having no colour or mark of inflammation. When he begins to unravel the confusion which this unequal distention produces, he finds the upper portion of the canal as he follows its tract towards the stricture or obstruction, more and more diseased; darker in its colours, and in a state approaching to mortification. The part that is actually noosed and strangulated, will be mortified: but below the strangulation, though for a little way as if affected by contact, the parts are black and mortified: yet there is no distention in the gut, no shew of turgid inflamed vessels; but, on the contrary, the intestine is remarkably white, and free from blood.

Let us now combine these appearances with the symptoms; the violent tormina and twisting of the upper portion of the bowels, until they are checked in the strangulation, or the mouth of the herniary sac, and the perfect quiescence of the lower portion of the canal. Let us further consider how many survive, when only a portion of the canal is incarcerated, so that its contents can still pass on*; and we shall be convinced that death follows the high inflammation of the upper portion of the canal, inces-

* That a part only of the diameter of the gut being fixed in hernia, will often destroy the patient, I do not wish here to conceal; but I believe it does so by preventing the natural action of the canal. The mere inflammation of a portion of the gut, without any mechanical obstruction, will give rise to obstinate retention of the contents of the canal.

santly working and agitated by ineffectual efforts to relieve itself of its contents; and that the strangulation is fatal as an obstruction, not as an immediate and direct source of inflammation and gangrene. The idea is entertained, that the inflammation extends into the abdomen, from the tumour of the hernia; and the pain upon pressure of the belly, is conceived to be the indication of the spreading of this inflammation to the peritoneum*. And this opinion that the incarceration of the hernia is the direct cause of inflammation and of all the consequent evils, has prescribed the practice of administering stimulating medicines. But were it understood that the cause of death is the violent and incessant efforts of the intestines to relieve themselves from their load of increased secretion, flatus and feces (passed retrogade), surgeons would seek to allay this violent commotion, instead of endeavouring, by exciting the bowels, to withdraw the strangulated gut at the expense of direct injury, and an aggravation of every dangerous symptom. Surgeons may put this simple question to themselves: does it not happen that when there is obstruction in circumstances which do not prevent the blood passing to the diseased or obstructed part, where consequently there is not gangrene from deficiency of circulation, yet the patient is carried off with the same train of symptoms, and in the same period, and with similar appearances after death, as in what is

* See Mr. ~~Cowper~~ Cooper, p. 26.

called

called strangulated hernia? It is the obstruction of the canal then which kills the patient, not the strangulation and injury to a part of the intestine: and the obstruction kills by the violence of inflammation occasioned by the accumulation in the upper parts of the canal, and the violent working of the muscular coats of the intestines.

OF THE CAUSE OF STRANGULATION, AND THE QUESTION OF SPASM IN THE SAC OR STRICTURE.

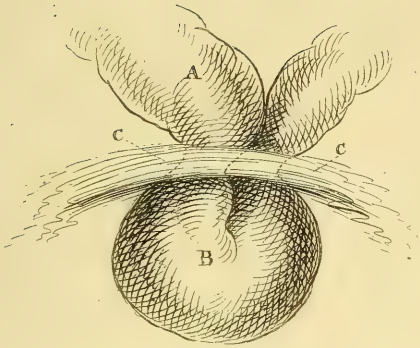
It is natural for us to turn to the last publication on the subject of which we treat. Mr. Cowper,* does not appear to me to have the correct idea of the most frequent cause of strangulation. Most surgeons consider that when the intestine is "so begirt as not to be capable of executing its proper office, the person to whom this happens, may be said to be in immediate danger." These are the words of Mr. Pott, and his conclusion results from the premises. If the view of exhibiting medicines be to extricate the gut from its stricture, and the discharge of feces is to be regarded only as a necessary consequence of such removal; then I think it is clear, says Mr. Pott, that a power or faculty of stimulating or irritating the muscular coat of the internal canal, ought to be the property of whatever is administer-

* The same causes which produce hernia, render them strangulated, &c. p. 22.

ed.

ed. There seems to me no point capable of being so clearly established as that in hernia, the intestine is in a very high state of painful excitement and action; that purgatives may still increase this, and by a happy effort as it were, draw the portion of the gut from its stricture; but if they do not succeed in this, that they must increase the inflammation, pain, and action, and accelerate the doom of the patient, cannot be denied.

But I have now to give my reason for thinking that the intestine is very seldom withdrawn from its stricture by the violent excitement of the guts within the belly. Suppose that instead of the uniform and smooth walls of the abdomen, every where presented to the bowels, there should occur a noose prepared by adhesion, or a herniary sac; and that in the accidental motions of the intestine, or in consequence of the general pressure of the viscera, a portion of the gut passes into this cavity or noose. Does an incarcerated or strangulated hernia result from this? No, surely; for the next successive effort in the peristaltic and vermicular motion of the intestine, pulls the portion from its hole. It is as easily withdrawn as introduced. To incarcerate the included gut, the fluid contents of the intestine must be pushed into the gut contained in the hernia, so as to distend it thus:



And now no effort of the gut A, will withdraw the portion B, from the neck of the sac C; because the incarcerated portion has been distended to the utmost, and now forms an angle so sudden and acute with the neck of the sac, that it cannot empty itself; and without being emptied, it cannot be withdrawn. Two things result from this view of the subject. It is necessary, in order to strangulate a piece of gut, not merely that it has escaped from the belly, but that beyond the hole or noose, by which it has escaped, it has the liberty of dilatation; for if it be not dilated, it will not be noosed, but be drawn back again, as it was obtruded. Further, it appears from this,

this, as well as from facts ascertained during operation or dissection, that the strangulated intestine must be a dilated intestine. That the stimulating the superior portion of the gut within the belly, in order to procure the retraction of the incarcerated portion, is dangerous, since it is as likely to distend it more as to retract it, and so by pulling on the hernia to confirm it! To the stimulating of the lower portion of the gut, there cannot be the same force of objection*. Let me further observe, that this reasoning on the original cause of the incarceration, does not materially affect the question of the propriety of an early operation; for whether the stricture be the primary and the sole cause, or a mere consequence of the distention, the operation with the knife at an early period of the incarceration and before strangulation has taken place, is equally to be desired.

* Often where an incarcerated hernia gangrenes, bursts, and discharges its contents, the feces pass freely from the wound, proving that the hernia could have received matter by the upper portion of the canal, if it could have returned it into the abdomen by the lower portion.

CHAPTER II.

OF THE SAC OF A HERNIA MORE PARTICULARLY, AND OF THE PART WHICH FORMS THE STRICTURE IN STRANGULATED HERNIA.

The term rupture we have understood to be improper, since it was adopted from an idea that it was the bursting of the peritoneum which produced the hernia. The peritoneum descends before the viscera, and forms what is called the sac.

In a recent hernia, the sac retains much of its original character of peritoneum; but in old hernia, it is dense, thick, and opaque, more like the dura mater than the peritoneum. "In the bubonocele, or that hernia which is confined to the groin, the sac is most frequently thin, consequently more easily divided, and there is required greater attention in its division, that we may not perforate it unawares; in the oscheocele, or scrotal hernia, if the disease be recent, the sac is usually thin also; if of long standing, it is sometimes of considerable thickness." Pott, vol. i. page 84.

"The sac is seldom affected" We

Lawrence

decidedly the best author

We have already observed, that there is an incessant muscular pressure on the viscera within the belly, while nothing but the firmness of the cellular membrane resists the increase of the herniary tumour. The first stage of the progress of hernia is by dilatation or elongation of the peritoneum; but the succeeding increase is more of the nature of a growth than of dilatation; for this stretching of the sac by the contents produces an excitement in the membrane or its vessels, which accumulate new matter, giving the membrane thickness and strength which it did not naturally possess. Even in the most recent herniæ, the sac is not merely the peritoneum dilated; for it will not retract to its former limits, nor suffer to be pushed within the ring, without lying in unequal folds. From seeing so many subjects with small protrusions of the peritoneum through the openings of the belly, without any contents, and being persuaded that often there must be a hernia of the peritoneum (if I may use such an expression) before there is a hernia of the gut, I imagine part of the omentum has in this case been the substance which has carried these processes of the peritoneum under the ligaments or tendons. In the subjects of a dissecting room, we very often find small digital-like prolongations of the peritoneum, like the finger of a glove, stretching through the ring, and under the ligament of the thigh: either these must precede the proper hernia, or the little sac is as yet of such a form that it does not admit of the piece of gut which forced it into this situation, to be retained or strangulated; for, as I have alleged,

leged, to strangulation it is necessary that the sac must previously admit of the distention of the gut.

NECK OF THE SAC.

As the body of the herniary sac increases in thickness and strength, so does the neck; and often the neck of the sac is thickened in a much greater degree than the lower part of the sac. It seems to me strange that any one should ask what produces this thickening in the neck of the sac, or how it comes to pass that the peritoneum should be a cause of strangulation. My preparations assure me that it is so. But, besides, does not the delicate omentum, when inflamed and adhering, strangulate the gut? Do we not see that part of the omentum which is in the neck of a hernia become firm, stringy, and of a tendinous strength? Do we not often find that the transverse cords, originally formed of the coagulable lymph, do actually strangulate the intestines, and even cut them through? And shall we not allow that the neck of the sac (the most exposed to every possible excitement, and always suffering in an equal degree with any part contained within) is always in some degree firmer than the natural peritoneum, and sometimes of a tendinous hardness? So that I have never seen the case where hernia could be with safety reduced without cutting it, the necessity of an operation being previously well marked. I will very boldly say, because I think I am

am bound to say, from what has fallen under my observation, that the neck of the sac must be cut as well as the tendon which surrounds it, and that of the two it will be better to cut the thickened sac, and leave the tendon uncut, than to cut the tendon and leave the neck of the sac to be dilated by means of compressing of the gut in the herniary sac, and consequently distending it in the neck of the sac.

The neck of the sac should always be so free that a gentle force can push the contents of the gut engaged in the hernia into the portion within the belly. I believe, in other words, it should admit the point of the finger by the side of the gut. I have assisted many in operation for hernia. On one occasion, the surgeon seemed fearful of wounding the epigastric artery, of which he had heard so much, and he attempted to push back the gut (which was free of inflammation and very natural), without cutting up the neck of the sac. After vainly attempting this, he was obliged to complete the operation in the usual way. The man did well for some time; but on the third day he had untoward symptoms, and the belly swelled, with great pain. He died of peritoneal inflammation. The portion of the gut which was in the hernia is represented inverted in the adjoining plate. We see that all the inner coats are torn asunder, and the peritoneum only remains. In the peritoneum there is a small hole, which had given way by ulceration, after the reduction of the gut, and from which the contents of the intestines passed into the cavity of the peritoneum, and destroyed the man by inflammation. This, then, is the consequence of boring the

the finger into the neck of the sac, and endeavouring to reduce the gut through too narrow an orifice. In the next plate I give the view of a gut burst at the place which had been grasped by the neck of the sac, in consequence of its being reduced by the hand, without operation by the knife. Am I not warranted in concluding that the gut, after lying some time incarcerated by the pressure of the neck of the sac, is incapable of bearing such a force of distention as will extend the neck of the sac?

The last point I shall touch upon in this introductory chapter, is that of SPASMODIC STRICTURE.

Mr. Cowper, in speaking of inguinal hernia, observes, that many surgeons have entertained an opinion in favour of the spasmodic nature of the stricture in hernia. This naturally brings out his, in other respects, very valuable observation, that the cause of strangulation is in the lower edge, or semicircular border of the transversalis, in illustration of this effect. This idea he conceives to be confirmed by the acknowledged fact, that the ring of the abdominal muscle, being of a tendinous nature, cannot partake of spasmodic stricture; but I know not what the peculiar symptoms of the bubonocele are, which warrant the conclusion that an explanation of the origin of muscular and spasmodic contraction in this species of hernia, can be held to put the question to rest in regard to all the others; for I assert that they are all subject to the same subsiding and rising of the pain, the same succession of alternate drawing towards the stricture and relief, the same feeling of binding and strangulation at the

seat of the stricture, which has given rise to the idea of the stricture being spasmodic. In short, with all the confidence which a man may have in so difficult and important a subject, and in opposition to a man so deservedly high in the estimation of the profession, I say that these symptoms of spasmodic stricture are referable to the action of the gut, not to the neck of the sac, or membranous bands.

OF THE DIFFERENCE BETWEEN INCARCERATION AND STRANGULATION.

The incarcerated hernia is different from the irreducible hernia, on the one hand, and from the strangulated hernia on the other. Incarceration consists in the obstruction to the passage, of the contents of the intestines, with the ineffectual effort of the portion of the intestine within to withdraw the part included in the hernia. But the strangulation of the intestine in a hernia implies that the source of its life and circulation is cut off; the vessels are compressed so that it quickly mortifies. A hernia may be incarcerated, and the motion of the bowels obstructed for many days; but when there is strangulation added to this, then the fate of the patient must be quickly decided; for a few hours will destroy the life of the gut.

Before the life of the strangulated gut be destroyed, its power of action is destroyed; and often when a strangulated gut is reduced, by enlarging the stricture

ture it will be within the abdomen, and still refuse its office.

CHARACTER OF THE HERNIARY TUMOUR.

Herniæ are to be distinguished from other tumours by these circumstances.

1. The situation; as when the tumour covers the abdominal ring, or lies on the top of the thigh, or on the umbilicus.

2. By the impulse communicated to the tumour when the patient is made to cough.

3. By its being returnable into the belly at night, or when the patient is thrown into a recumbent posture. Although this be not the case when you examine, yet inquire if it was not once so.

4. When the hernia contains intestine, it is elastic; if the intestine is returnable, the tumour is compressible, and accompanied with a gurgling noise—if strangulated, tense as a ball, yet distinguishable from a solid body. When the tumour contains omentum, it is more irregular.

5. If the tumour diminishes on pressure, still the openings in the tendons are obscured, and the sac is felt empty.

6. When the intestine is incarcerated, and the symptoms of intestinal obstruction succeed, there is pain referable to the part, and a drawing down of the belly to the ring.

The tumour, without the internal evidence of symptoms, would often be insufficient to announce

with sufficient accuracy, that the disease was a hernia, and to warrant operation. I have operated where the inguinal glands clustered about the sac, so as to obscure its natural character; and I assisted Mr. Lynn in an operation on a lady, where two hydatid tumours attached to the sac gave it a very great obscurity. In general, however, by a continued pressure in the examination of the neck of the tumour with the fingers, we shall be enabled to ascertain that the tumour does actually proceed from the enlarged opening of the tendons.

Herniæ have been classed into the acute and chronic. This appears to me very trifling; and seriously considered, the subject does not admit of such a classification.

To produce hernia, there must be predisposition, and there must be an immediate cause. The latter is uniform, viz. the compression of the abdominal viscera by the muscular walls. The former consists in an unnatural laxity, and wideness of the openings through the tendons of the muscles. This laxity can differ only in degree; and the degree of width in the ring, or under the ligament of the thigh, makes all the distinction.

When there is great laxity, the tumour forms slowly; the bowel gradually descends; it is protruded with every slight effort of the muscles of the belly; it is not apt to be strangulated, because the opening is wide. The hernia often appears in infancy or early youth, and remains long without dangerous consequences resulting from it.

This

This they may call a chronic case; but it is liable to become as quickly fatal as any other, by the descent of a new portion of gut, or omentum, or by unusual congestion in the contents of the hernia.

When there is less predisposition to the disease, a more powerful exertion is necessary to produce the hernia. The opening through which it comes down is small, the gut is more closely embraced, and the progress from incarceration to total obstruction of the circulation of the part, and strangulation is rapid.

The terms acute and chronic are better adapted to signify the natural type and tendency of a diseased action. The distinctions in the progress of hernia depend on a mechanical effect.

OF HERNIA DESCENDING THROUGH THE RING OF THE ABDOMINAL MUSCLES.

The INGUINAL HERNIA we have found to be that which descends through the ring of the external oblique muscle of the belly. SCROTAL HERNIA is the increase and further descent of the same tumour.

WITH WHAT DISEASES IT MAY BE CONFOUNDED.

The testicle partially descending at a period of life later than usual, may be mistaken for inguinal hernia: often a truss has been applied in this case. I have seen

the operation for bubonocele performed for the tumour of the testicle! The scrotum being empty of the testicle, should put us sufficiently on our guard.

A sac of fluid formed upon the cord, or the cellular hydrocele of the cord, may be mistaken for this kind of hernia. Perhaps if large the tumour may be known from its transparency; it is uniform and elastic; it does not receive the impulse from coughing, as the hernia does *.

Varicocele may be mistaken for this kind of hernia. But it has a woolly, or sometimes a stringy feeling. Further, the blood being pressed from the vessels of the cord, if we press with the finger on the ring and upper part of the cord, the tumour will return by a uniform enlargement (and not a descent from above), in consequence of the filling of the veins with blood, through the arteries of the cord and testicle.

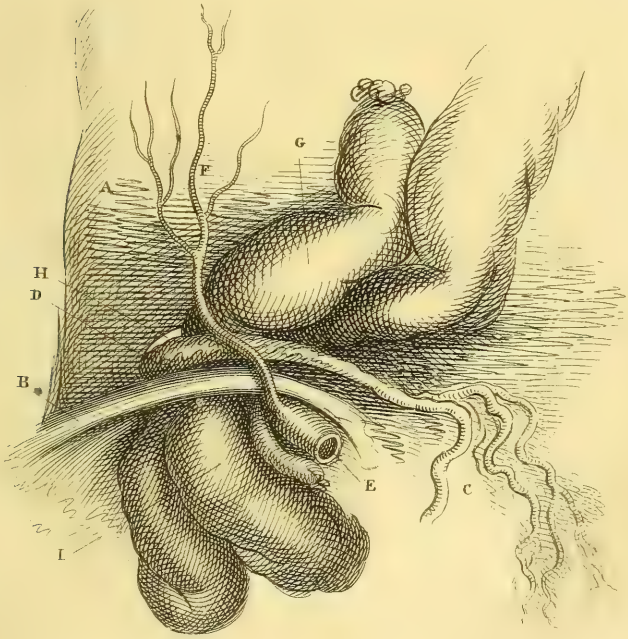
In hydrocele of the tunica vaginalis, the tumour is often precisely of the form of a scrotal hernia. It will be distinguished, however, by its uniformity; its transparency; its not receiving the impulse when we make the patient cough; its history, particularly as it will be found that the tumour began in the testicle, and gradually extended upward, while in hernia it begins in the groin, and falls down into the scrotum.

* Sometimes, however, it does receive the impulse, when the dropsy of the cellular membrane of the cord extends much into the abdomen.

I have

I have seen four surgeons unanimously of opinion, that a bubonocele was a suppurating inguinal gland. From this, as well as from the enlarged testicle, and the hæmatocele, the history and the urgent symptoms should always enable us to distinguish hernia.

Most commonly this hernia from the abdominal ring descends obliquely downward, and inward, before it escapes from the ring.



In this plate I have given a plan of the manner in which the gut descends. It is a view of the ring from within. A, the abdominal paries. B, the fe-

moral ligament. C, the spermatic vessels, and vas deferens, before they are firmly united into a cord. D, the spermatic cord passing out through the ring. E, the femoral artery. F, the epigastric artery. G, a portion of the gut which has passed through the ring at the usual place, and which, by taking the rout of the spermatic cord, has got before the cord, and before the epigastric artery. H; had the gut G passed out here, it would have carried the spermatic cord in some degree before, and have pushed outward; or in this case the cord might be found spread upon the neck of the sac, and the epigastric artery would have been before the mouth of the sac.

I, A portion of the gut passed through the place by which the crural hernia escapes—a point to which we shall afterwards speak.

In inguinal hernia, then, the tumour comes down obliquely inward, for the most part; and this may be distinguished by a fulness in the tendon of the external oblique muscle, on the side of the ring nearest the ilium; whereas the other comes out more directly, and on the inner side of the cord—an observation for which I believe we are indebted to Mr. Cline.

When the hernia has escaped from the ring, it often carries some of the tendinous bands with it, which are dispersed upon the neck of the sac *. Over these

* I find in late authors, that the abdominal ring, as it is called, is still very ill described, as a splitting of the fibres of the tendon. Were it so, the spermatic cord would unquestionably be strangulated by the action of the abdominal muscles, and there would be no chance of the gut in hernia escaping

these fibres the membranous expansion comes down from the muscles of the belly, and being considerably strengthened, forms an outer layer to the coats of the tumour. When the surgeon in his operation has slit up this, he still finds another membrane, which I should say was the expanded web of the cremaster muscle, if I had not observed it so particulary strong in the hernia of the labium in women. Finally, under this there is still the sac, the prolongation of the peritoneum.

OF THE REDUCTION OF THE INGUINAL HERNIA BY THE HAND.

The taxis is the reduction of the contents of the herniary sac, by position of the patient, and pressure of the hand.

To accomplish this reduction, the patient is made to rest on his head and shoulders, his hips and thighs are raised and supported, and of consequence the spine

escaping mortification, as in the natural anatomy we find the lower margin of the ring turned out spirally, while the lower part of the pillar runs straight to the os pubis. This direct insertion of the inferior part of the lower pillar, checks the drawing of the spiral fibres, which would otherwise embrace and confine the spermatic cord too closely. In hernia, too, and certainly in old hernia, the marginal fibres of the ring are not merely split and held aside by the hernia, but stretched and carried down upon the neck of the sac, so that no pulling of the muscles of the belly operates on the neck of the sac.

curved,

curved, and the muscles of the belly relaxed. The thighs must at the same time be supported, and brought near together, that by relaxing the fascia the ring may in some measure be relaxed.

One arm of the surgeon being now passed betwixt the thighs, both hands are applied to the tumour, the first effort being gently and uniformly to compress it. By this it is intended to press the fluid contents of the intestine, which is within the sac, into that part of the canal which is still within the belly; for unless the distention of the incarcerated gut be diminished, how can we expect the gut to be returned through the narrow ring? Having succeeded in diminishing the tumour, we then endeavour to accumulate the sac towards the lower part, and at the same time to direct the upper part of the tumour towards the centre of the ring; or we embrace the whole tumour with the palm of the hand, and make the ends of the fingers knead and direct the neck of the sac, while the fingers of the other hand keep occasional pressure on the ring, guarding from falling down what is reduced.

If this fail, we try a variety of positions, the hanging of the patient by the thighs, &c.

I know of no error more common in reducing hernia, than the pushing of the tumour in a direction toward the side of the ring, by which the neck of the sac is twisted, and the reduction made impossible, however great the force may be which is used. This will be the effect of pushing the tumour towards the anterior and superior process of the ilium, as advised by Mr. Cooper.

When

When the hernia consists in part or entirely of omentum, the reduction is often difficult, from its being a solid and incompressible mass, which must be reduced every inch by the pushing of the fingers, and the kneading of it, as it were, into the ring.

The exertion of the surgeon in reducing hernia, should rather be persevering than violent. The parts when uniformly supported by the sac, do in general bear a great deal; and certainly often after twenty minutes exertion, we succeed. But every one must see early in practice, high inflammation, accelerated by the violence of this operation, and (though more rarely) the actual rupture of the bowel.

When the strangulation is advanced, or complete, our efforts must be more guarded, and less persevering.

Failing by mere mechanical cunning to reduce the hernia, we must excite the bowels; and I have already said, that the laxative medicines given by the mouth ought not to be of a drastic nature, and that we should trust to clysters chiefly. These must not consist of a little fluid to excite the rectum, as in a common case; but the whole of the great intestines must be distended by the syringe.

This failing, we give the infusion of tobacco (a pint of water to two drachms of the tobacco); and during the delay of the operation of these we apply cold cloths to the tumour. We have also the warm bath prepared, and bleeding and the warm bath may produce

produce a languor and faintness favourable to reduction; and now we attempt the operation again.

OF THE TRUSS.

When the hernia is reduced, we still feel the empty sac; and now the surgeon must be particularly careful that no portion of the gut or of the omentum remains in the neck of the sac, when he is about to apply his compress or truss; for high inflammation, or all the effects of strangulation may result from this.

A, the cord. B, the ring (we shall suppose). C, the pad applied here will chafe and compress the cord. Applied at D, it will often with more ease, and as effectually, support the rupture.

Still

Still keeping the patient supine, with the muscles of the belly relaxed, we examine well where the finger sinks into the ring, and if possible distinguish the course of the cord. We then try whether pressure towards the outer side of the ring does not effectually support the hernia. This it will do, if the passage of the neck of the sac be at all oblique through the abdominal tendons. If this be the case, then the pad of the truss is to be applied to the side of the ring, yet so far removed from the crest of the pubis, as not to press the cord against the os pubis.

When the pad of the truss is applied, as in the place of the circle D, it may prevent the oblique descent of the hernia; and yet as it does not press against the bone, no pain, swelling, or varicose state of the cord follows. But most generally the passage is so direct, that the pad must be placed as on the circle C, in which case the only resource is, so to tease out and knead the hair of the pad, so as to be of the form of the dotted line E, that a kind of channel be left for the lodgement of the cord *. A hard pad and strong spring wastes the substance about the ring, leaving only the tendons and skin. By perseverance in the use of a proper truss, the neck of the sac may be made to adhere; but in the adhesion of

* Baked hair is the proper substance for the pad; and often the patient will himself give a form that sits with perfect ease, when that given by the maker chafes and irritates.

such

such membranes, unsupported by a change in the tendinous ring, I have no faith as a support against the recurrence of hernia.

OPERATION FOR BUBONOCELE AND SCROTAL HERNIA.

The first incision is carried through the common integuments only, beginning about an inch and a half above the base of the tumour, and reaching very near the bottom of the scrotum. If the knife be carried lower, the tunica vaginalis testis may be cut. The blood escapes from the external pudic artery, but seldom requires the tenaculum.

The fingers being spread upon each side of the incision, or the tumour grasped by the hand on the back part, the small transverse slips of cellular membrane which may remain are touched lightly with the edge of the knife. Then the thin aponeurotic membranes are scratched by the knife, when the grooved directory is thrust under them, layer after layer, and the edge of the knife run along it, until the thin, or at least the bare lamina of the peritoneum appears.

Let it be recollected that though rarely, yet it sometimes happens that the spermatic vessels (and particularly the vas deferens), are spread on the fore part of the sac of the bubonocele. So that the patient may be castrated by a stroke of the knife, even before the sac is opened!

With the forceps, the proper sac is now pinched up, and cut by carrying the knife horizontally. The probe or directory being introduced, the opening is enlarged, when the finger may be put into the sac, and the whole length of the sac slit up.

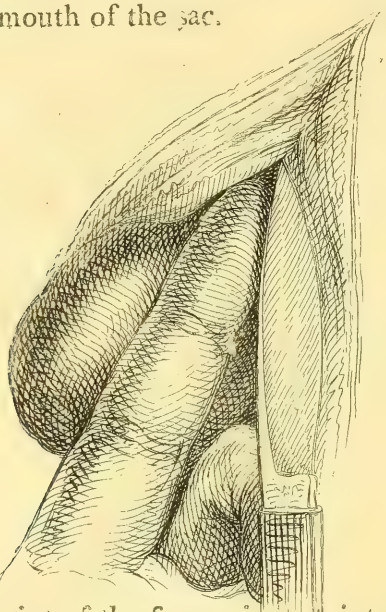
In doing this, there is no apology for haste; and even if any slight doubt arises whether or not this is the sac which we have exposed, then we run in the directory under the membrane. If this be only a layer of cellular membrane, the directory passes with difficulty; if we have penetrated the sac, the point passes easily. Again, we are not always to expect the dark-coloured gut; but the fatty, cellular substance of the omentum may present; nay that fat may be adhering to the sac, which may still more perplex the young surgeon.

Fluctuation in the sac I conceive to be a very rare occurrence; nor are we to value highly the prognostic from the colour of the fluid which escapes, since we have the parts themselves under our inspection.

The surgeon now introduces his finger into the neck of the sac, and feels the place and degree of the stricture. If he can easily introduce the point of his finger into the belly, he may try to reduce the gut without further cutting. But this is not likely; and to endeavour to dilate the narrow neck of the sac by the finger, is as full of danger as the attempt to compress the gut is, and forcibly to reduce it. I have introduced a plate, in which we see the effects of violence in this part of the operation.

If

If the tip of the finger be admitted into the mouth of the sac, then the ring and the mouth of the sac being raised on the point of the finger, the transverse bridling fibres are to be scratched with the point of the knife; when the finger may dilate what remains. But let not the finger be bored forcibly into the mouth of the sac.

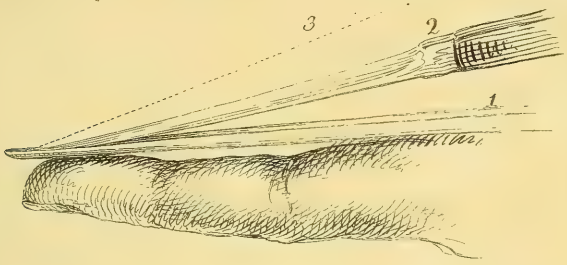


The point of the finger is put into the neck of the sac, so as to lift up the edge of the tendon: the knife is then carried forward on the finger, and what is felt firmly constricting, is cut fibre after fibre with the point of the knife.

When the finger enters easily, the stricture is sufficiently taken off.

If the neck of the sac does not admit the finger (the assistant holding down the distended intestine), the surgeon insinuates the directory into it, and with

with the probe-pointed bistory he cuts the mouth of the sac and the ring.



In this part of the operation, the directory, 1, lies along the finger. The bistory, 2, is introduced along it. But now we do not cut with a sawing motion of the instrument, but by merely raising it (as from 2 to 3). By this means only, the strongly resisting parts of the tendon is cut.

The edge of the knife is directed across the fibre of the tendon, upwards, neither inclining to the pubes nor to the haunch.

The finger now follows the directory, and enters the stricture, or passing it through what appeared to be the chief stricture, another, the firm inner margin of the neck of the sac, may be felt strongly embracing the gut, where it comes first from the cavity of the abdomen. This inner stricture is to be cut like the last, the assistant holding up the ring with the blunt hook, and guarding the intestine below.

OF THE DIRECTION OF THE INCISION OF THE RING, AND OF THE PROPRIETY OF CUTTING THE RING WITHOUT THE NECK OF THE SAC.

Mr. Cooper says, it is best to divide the stricture, by passing the knife between the ring and the sac, as a larger portion of the peritoneum is thus left uncut, and the cavity of the abdomen is afterwards more easily closed. In many cases, this is not practicable; and in the general question, the propriety I think is doubtful. It must be very difficult to do this, when the stricture is narrow, and the distention of the intestine included in the hernia great. It must be difficult to dissect the tendinous circles which are around the neck of the sac, from the sac itself; and when this is done, the sac will still resist in a degree which requires the forcible introduction of the finger, and endangers the intestine. It will be recollected, that no cutting of the ring, in nine of ten cases of hernia, would be required, were we at liberty forcibly to bore and stretch the mouth of the sac. But to the best of my judgment, this forcing of the mouth of the sac, is full of danger to the intestine.

As to the abdomen being afterwards more easily closed, it is still a question. The tendon requires to be cut very freely to allow of the dilatation of the neck of the sac, inflamed and condensed by the

continued pressure. We need not now say that as the cause of hernia is originally in the deficiency of the tendons, or some malconformation, so will the hernia be particularly apt to recur wherever these tendons are cut extensively. Further, when the neck of the sac is cut, it readily adheres, or the inflammation condenses and gives firmness to the cicatrix; but when the neck of the sac is not cut, we cannot expect adhesion or contraction of it so readily to occur.

The only question that remains in my mind is, whether will the inflammation of the peritoneum of the general cavity of the abdomen be more apt to follow when the mouth of the sac is cut, than when the cut is carried within an inch of it? On this point I should wish to have more facts from dissection of the parts after unsuccessful operation. But of all that I have hitherto dissected, the inflammation did not spread from the cut of the mouth of the sac, along the surface of the peritoneum. The inflammation evidently had its origin in the intestine.

The stricture higher in the neck of the sac*, Mr Cooper imagines is produced by the pressure of the transversalis

* This stricture, high and in the mouth of the sac, I have long known, as may be seen in my Dissections.—"I have found, in operating on the inguinal hernia, that the constriction was not in the ring, but in the peritoneal sac, fully two inches within it; and in the case to which I allude, the strangulation was so complete that the gut was gangrened." Appendix, p. 5. Cases occurring since have confirmed

transversalis muscle of the abdomen; and he re-recommends the following manner of cutting it.

The surgeon passes his finger up the sac, and through the abdominal ring, until he meets with the stricture. He then introduces the probe-pointed bistory, with its flat side towards the finger, but before the sac, and between it and the abdominal ring, his finger being still a director to the knife. Thus he carries the knife along the fore part of the sac, until he insinuates it under the stricture formed by the lower edge of the transversalis and internal oblique muscles; and then turning the edge of the knife forward, by a gentle motion of its handle he divides the stricture sufficiently to allow the finger to slip into the abdomen. The direction in which this stricture is divided, is straight upwards, and opposite to the incision of the outer tendon.

I cannot help expressing my conviction of this being a very difficult operation; for either the muscle has firmly embraced the peritoneum, still of its natural tenuity and elasticity, or the membrane has inflamed under the pressure, and is thickened. If the first supposition be the true one, then will it be difficult to force a probe-pointed bistory under the edge of the muscle; a sharp one would pierce the peritoneum; and if the membrane is thickened, the sac will resist after the tendon or muscle is fully cut. Further, if the stricture which we feel be the

confirmed me in the opinion, that this internal stricture is in the peritoneum, and surrounding cellular membrane, more than in the tendons or muscular fibres.

natural

natural embracing of the parts, then, be the fibres tendinous or muscular, a strong directory, introduced over the mouth of the sac, will tear up or stretch them so that the knife is not required in these dangerous depths; and if, as I think I have ascertained in most cases, there is a general thickening of the sac, or of its surrounding cellular membrane, this deep dissection on the outside of the sac will not be sufficient to undo the stricture, without the force of the finger within the neck of the sac. That in several cases the stricture is in the sac (as in the instance I have engraved), cannot be doubted. I suspect that the sac, in all cases above a few days standing, is more or less condensed, and that when inflammation or compression has been for any considerable time, although the stricture may have originally been on the outside of it, it is no longer entirely so.

If the point of the finger bolts up against a thickened and entire ring, it is a stricture which encircles the neck of the sac, and should be cut from within the sac; for if it entirely encircles the neck of the sac, it is no stricture from the margin of a muscle or tendon. Were the stricture from the margin of the muscle, there would only be a corded feeling on the upper side of the neck of the sac.

All incisions of the neck of the herniary sac are to be made directly upwards. This is the manner which the mere convenience would point out; and when we consider the thing more deeply, we find that the epigastric artery may be cut by too adventurous an incision.

The epigastric artery mounts in general on the back and inner side of the neck of the sac; and even when in this more common relation to the hernia, by too long an incision it may be cut, as I have seen happen. But sometimes (as when the hernia comes down nearer the pubes), the epigastric artery rises on the outside of the sac, and turns round it to rise upon the belly; so that if we cut freely outwardly and upward, we must open it there.

Lastly, the epigastric artery, sometimes rising on the outside of the neck of the hernia, gives off the obturator artery; and this last clinging round the neck of the sac, descends again into the pelvis; so that an incision in any direction would here meet the artery! This, though I could give a drawing of it, from my own experience, I fancy must be rare.

Notwithstanding these apparent difficulties, in regard to the course of the epigastric artery, little mischief has resulted in the operation. The danger, however, is still so far a possibility, that it leaves an unpleasant impression on the surgeon's mind during operation. There is scarcely a possibility of our cutting this artery, if the bistory is raised like a lever on the finger, so as to cut only what strongly resists, not the softer and yielding parts. I believe the epigastric artery has been cut, when surgeons have mistaken the cause of the difficulty in returning the gut, and have cut to a much greater extent than was necessary.

I have seen this artery cut fairly across, and yet very little blood escaped, which I could not account for.

for. Mr. Sharpe supposed it easy to take it up with the needle, if cut. I should imagine it might be done. Mr. Hey, however, found it impracticable, and was obliged to stop it with graduated compress of sponges, over a dossil of lint.

OF THE INTESTINE.

The intestine is to be gently and uniformly pressed, by grasping it with the palm and fingers of one hand. Being empty of flatus, the last portion of the gut which came out is to be replaced by the alternate pressure of the two fore-fingers; taking care that in trying to accelerate the entire reduction, we do not push the finger too forcibly into the opening of the tendon, carrying the gut before it. That accident may take place, the effects of which I have represented in a plate. When a portion of the intestine has been long incarcerated, and yet is not strangulated or deprived of its circulation, it is apt to form adhesions; and while the intestine included in the sac is passing rapidly to gangrene, the part embraced by the neck of the sac adheres to the peritoneum. This, in one instance in operation with my friend Dr. Cheyne of Leith, I separated with my finger. To apply the knife in this case, I conceive is out of the question. Were the tendons and peritoneum to be cut up for some inches, and the belly exposed, it would be a hazardous dissection to separate the gut with the edge of the knife. If these adhesions are new, they

may be separated by the finger; if confirmed, it is better, I think, to undo the stricture, and bring the integuments over the intestine in the best manner we are able.

My friend Mr. Lynn had a case in which, after reducing the gut, the symptoms did not remit, and the patient died of the usual signs of strangulation. On dissection, it was discovered that the gut had been passed round a cord within the belly. Sometimes such circumstances may be detected, by introducing the finger as far as the part will easily admit after the reduction of the gut *.

COLOUR OF THE STRANGULATED INTESTINE.

I HAVE seen the intestine very firmly strangulated by the effect of over-distention, with flatus, and the coats of their natural transparency and colour. But in general the portion of intestine which is included in a stricture, is of a dark red, approaching to a

* Very generally, if I am to judge from dissection, the gut adheres to the peritoneum behind the ring. I even suspect that this adhesion of the intestine is, in some cases, a cause of continued obstruction, after the reduction.

Inflammation is attended with an increase of the quantity of blood circulating. The state of the blood in the strangulated gut, is the diminished freedom to the return by the veins, or total stagnation. An incarcerated gut may be inflamed; but a strangulated gut does not suffer by inflammation. See Mr. A. Cooper, p. 26.

brown

brown colour, and the substance of the coats much thickened by infiltration into their interstices; so that they acquire a fleshiness in their appearance.

The first stage of strangulation is exhibited in a dark red colour, with the veins turgid and distinct. The second is shewn by a darker brown, with somewhat of a purplish tint, and the disappearance of the blood-vessels on the surface.

Mortification is distinguished by a more lurid brown colour, and no fluid blood appearing when the surface is touched with the lancet. It is confirmed when black spots are seen upon it.

Were I entirely to trust my own experience, I should say we could not return a piece of gut into the abdomen, which was unfit to be returned. For there are adhesions formed within and at the mouth of the sac, at the same time that the intestine is proceeding to gangrene in the hernia itself.

If a suspicious intestine be returnable—if there be a spot evidently gangrened—I should recommend the needle and ligature to be simply passed through the coats of the intestine, so as to preserve that part of the gut opposite to the ring.

I doubt whether the occasion for cutting away an entire circle of the intestine, and the possibility of reducing the ends of the intestine when they have been cut, will occur. I conceive, that in these cases which may seem to indicate and require such an operation, we should do better to treat more simply. The stricture being undone, I would be inclined to let the intestine remain in the sac.

If

If there should happen to be an accidental cut in the intestine, or if the intestine has gangrened and burst, a free discharge of the contents of the upper part of the canal should be allowed before any attempt is made to unite it by ligature, or to reduce the intestine; because no quiescence can be expected in the portion of the gut wounded, until the accumulated contents of the upper portion of the intestines have passed it, or are evacuated.

OF THE OMENTUM.

The epiplocele is a troublesome disease, not so immediately dangerous as the intestinal hernia; but still, from the exposure of the tumour to blows, and the omentum being precursor to the falling down of the intestine, it is a disease requiring attention.

The truss for this kind of hernia must be used with precaution, as if the omentum be not kept entirely up, by pressing upon it inflammation may follow. Upon its first descent, this hernia is often attended with pain in the abdomen*; and then it greatly resembles a strangulated intestinal hernia. But if the patient can retain light food and purgative medicines upon his stomach, there is usually no necessity for performing the operation.

In the symptoms of omental hernia, there is this distinction from the intestinal, that stools can be procured. The hiccups, too, are less violent and

* Hey.

constant;

constant; the pulse somewhat fuller; the belly not so tense; and the disease has a longer course. To the feeling there is an inequality in the tumour.

When the stricture of the omentum proceeds to great lengths, then the tumour inflames, and proceeds through the stages to suppuration; while the inflammation runs retrograde upon the omentum, within the belly. A greenish yellow betrays the actual gangrene of the omentum during operation.

The omentum contained within a herniary sac, changes remarkably from its natural state. It assimilates into a mass; its lobes become large; it is loaded with fat; and strings of adhesion connect the several masses; or it forms a round, smooth ball, by its condensation, having only a connection with the omentum within the belly by a narrow somewhat tendinous neck. My preparations assure me of the truth of Pott's remark—"All that part which passes through what is called the neck of the sac, is by constant pressure formed into a hard, firm, incompressible, carious kind of body, incapable of being expanded, and taking the form of the passage in which it is confined, exactly filling that passage, and rendering it impossible to push up the loose part of it which fills the scrotum."

When the omentum in a natural state escapes from the belly, in consequence of a wound, I have seen it impossible to reduce it, in consequence of its extreme delicacy; and having been torn and mashed in the attempt, it was found necessary to cut it off. Mr. Hey, I see, thinks it possible "that when the omentum is in a state tending to gangrene, though not

not appearing unsound, it may suffer irreparably from a degree of pressure in the reduction, which would not have injured it had it been perfectly sound *."

We have many occasions, then, for cutting off the greater part of the omentum, as this consolidation and growing together; (sometimes it becomes like schirrus); adhesions to the sac; gangrene. Preparatory to cutting the omentum, we must spread it fairly out, and unravel it, that no portion of the intestine be included in it. The remaining edge of the omentum bleeds proportionate to the quantity cut off; so that, to prevent a coagulum of blood being lodged in the belly, we must either include the whole mass of the omentum in a ligature, or take the vessels up with the tenaculum. The latter method is to be preferred; for the tying of the end of the omentum is but substituting a ligature for the stricture of the omentum; so that restlessness, anxiety, and fever; pain of the belly; nausea and vomiting; in short, peritoneal inflammation, and death, may follow this.

I have certainly seen a ligature put about the whole process, without a wrong symptom; but it was done in the natural state of the membrane, when its softness yielding, the ligature came away on the second day. A ligature remaining about a firm tendinous mass of omentum, I should imagine to be

* Mr. Hey and Mr. Warner describe a particular crossness or brittleness, as affording a more distinguishing mark of unsoundness than the lividity of the omentum.

a cause

a cause of great alarm and danger. If the omentum is cut, the intestine should be first reduced, that the flow of blood may be perfectly free to the cut vessels of the omentum, before it be reduced. Let care be taken also that it do not slip up into the belly, which a motion of the patient, or perhaps of the bowels, will cause it to do.

If the omentum be entirely dead and gangrened, it were perhaps as well to look that no stricture remains upon it, and to take the greater mass only away, and leave part of it to remain, which will afterwards cast off. But if it be in part diseased, in part destroyed, if left it will grow into a fleshy irregular mass, requiring afterwards to be extirpated. See Hey's Surgery.

OF THE WOUND AFTER REDUCTION.

The integuments (but not the sac) are to be brought together by one or two stitches. These may be supported by adhesive straps. Above this a soft compress of lint and of old linen is placed, and the whole secured by a roller passed as a spica bandage. Let the patient apply his hand on the dressings when inclined to cough, or when he wishes to have his bed or clothes shifted.

FURTHER DISQUISITION ON THE SAC OF THE HERNIA.

Sharpe, after speaking of the manner of cutting the neck of the sac, continues—"If, upon examination, it shall appear that the intestine is strangulated within the abdomen, which may possibly happen from a contraction of the peritoneum, near the entrance into the sac, in that case the incision must be continued through the length of the contracted channel, or the consequence will be fatal, notwithstanding the intestine be restored into the belly. On this account the operator should pass his finger up the sac, into the abdomen, after the reduction of the gut, in order to discover whether it be safely returned into its proper place. The opening being made, the intestine is gradually to be pushed into the abdomen," &c. *Sharpe's Operations, ninth Edition, page* 26.

The original Monro observes, "after the bowels are reduced in appearance, the surgeon ought to search with his finger lest there be any contracted ringlet, cross bars, or productions of the peritoneum above the ring of the muscle, which might continue the strangulation of the gut, that they may be cut to make the gut quite free. Such rings," he continues, "are most readily to be met with in people who have long worn trusses."

In Mr. Hey's tenth case, he thus expresses himself—

self—"The stricture was not formed by the ring, but entirely by the neck of the hernial sac, into which I could not introduce my finger. I was obliged to divide the ring pretty high, that I might with safety divide the neck of the sac; and this last division was effected by cutting along the groove of a director, till I had made a sufficient aperture for the introduction of my finger." In his remarks upon this case he continues—"This case affords a decided instance, in addition to others already published, that the neck of the hernial sac is capable of becoming so contracted as to produce a fatal strangulation."

It has appeared to me, in the following instance, exactly as it is here represented. A part of the colon was included in an inguinal hernia: the intestine being freed from the sac, rose in a remarkable degree, so that it could not be held down to expose the ring. Upon cutting the ring, however, pretty freely, so that the finger was introduced with ease, still the intestine was much distended, and could not be reduced. Upon introducing my finger about an inch within the outer ring, I felt a narrower ring than that without, which formerly begirt the intestine. I carried my finger up to it, and cut it a little with the point of the probe-pointed bistory, and enlarged it with my finger. Here I am sure, if I had thought it right to dissect on the outside of the neck of the sac, I could not have done it. If it were asked, why do I suppose that this internal stricture was from the sac; I should say, that it was perfectly circular, and like a firm ring; not as if the membrane was merely bound down by a slip of tendon

don passing over it, or the edge of the inner muscles of the belly. And further, in dissection in similar cases of bubonocele, I have found the stricture at this place still resist the finger, after all the fibres of the surrounding muscle were dissected off. The appearance of this stricture in the peritoneum is represented as I have found it on dissection.

And now as to the outside of the neck of the sac, there is something necessary to be observed. The term Abdominal Ring has been taken not from the natural appearance of the parts on dissection, but the appearance, or rather the feeling, during operation. For the frequency of the disease, and the occasion of operating, gave opportunity to observe the state of the parts in disease, before dissection was practised, when the operators knew not the natural anatomy.

In recent hernia, and before the condensation of the surrounding cellular membrane has confounded the parts, we can easily distinguish betwixt the tendons of the ring, or Poupart's ligament; but when the inguinal hernia particularly is large, and of long standing, a firmer circle or ring may be felt, when the finger is introduced into the mouth of the sac: but on the outer surface there is no such distinction betwixt the sac and the tendon of the abdominal muscle; for as the hernia enlarges, and pushes lower, the tendon of the external oblique muscle is stretched, and expanded over the neck of the sac; and at the same time, the general expansion of condensed cellular membrane which covers the abdominal muscles, acquires more strength and thickness, and

and further covers the inequality which might otherwise enable us to distinguish between the neck of the sac and the abdominal tendon. Even in the bubonocele of women, as represented in the plate, we see that these uniting lamina of aponeurosis covering the sac, are very strong.

Many before the time of Pott imagined that the strangulation of hernia was in the contents, and that the stricture was an accident arising from the inflammation and distention of the gut; or, in other words, that the intestine was first inflamed, and, by means of the alteration produced by such inflammation, it became too large for the tendinous aperture, which therefore made a stricture upon it *. This is an opinion which has arisen from the inflammation, and perhaps the obstruction, being so frequently continued after the operation. This led them to a very dangerous conclusion, that freeing the intestine from the stricture was not removing the disease.

Indeed, when we consider that the tendons or ligaments are never more contracted than natural, but on the contrary, always more stretched, and forming wider openings than natural even in strangulated hernia—when we find that they are parts the least capable of change of any in the body, and certainly of any of the parts concerned in hernia—we see a good reason why surgeons should reject the idea that the tendon is the active cause of strangulation. We must take it as a settled point, I conceive,

* See Pott, p. 91.

that

that the muscles and tendons of the abdomen are merely passive in the change producing strangulation in hernia. When a small hernia bursts through the split tendon of the abdominal muscle, the columns of the tendon, in whatever part of the belly the rupture may have taken place, will be drawn tight on the neck of hernia, and cause strangulation. But when a hernia remains down, and the economy of the included portion remains for a time perfect, the strangulation which may afterwards take place arises from other circumstances than the tendons surrounding the sac; and although we may still say that these tendons form the stricture, yet are they passive only. They are as wide as they were; nay often, as I have said, dilated. It is the swelling of the parts within which is the cause of the incarceration and strangulation.

The parts within the stricture are the peritoneum, and surrounding cellular membrane, and the gut or omentum, included in the peritoneal sac. How the former will be strangulated independent of any change in the sac, I have already described.

But let us observe how a stricture of another kind, be it the omentum, or the adhesion of the intestines, or strings of coagulable lymph formed betwixt any of the bowels, become thick and inflame, in consequence of the strangulation of the gut, and we shall conceive how an incarcerated hernia produces a reciprocal influence betwixt the gut and the peritoneal sac; and that while the former is irreparably injured, the latter becomes thickened, and its attached

tached cellular membrane distended by the infiltration of coagulable lymph.

It is this condensed matter of the neck of the sac which must be cut through in hernia, in nineteen of twenty cases, or else an undue and a dangerous degree of force must be used to distend it, by compressing the lower part of the convolution of gut which is contained in the hernia.

It is alleged, that if we can disengage the hernia by means of cutting the tendons on the outside of the gut, without piercing the sac or peritoneum, it may be done very freely. This is precisely what I object to. You cut freely the tendons of the muscles, the only support of the bowels in future; while in cutting the sac and tendon, you cut very little of the latter, and the neck of the sac is consolidated in the cicatrix, if the tendon does not unite.

A MORE PARTICULAR INQUIRY INTO DR. MONRO'S PROPOSAL OF OPERATING BY CUTTING THE TENDON ONLY.

The original Monro had proposed, in cases of strangulated hernia, with adhesion to the sac, to relieve the stricture merely, and to allow the parts to remain. His son, in his work on the *Bursæ Mucosæ*, proceeding upon the acknowledged principle, that sacs and cavities, when opened, were prone to run into universal and dangerous inflammation, proposed to relieve the stricture of the tendon, and to return the bowels without dividing the sac. This Dr. Monro

at

at the same time acknowledged was a proposal of Petit only, observing that he mistook the principle on which the operation should have been done.

In his first case, with Mr. Alexander Wood, a case of crural hernia, they cut the tendon, and then reduced the hernia *with the utmost ease.* In the next case (of hernia congenita), they found the neck of the sac contracted, and requiring to be cut. In another, a large hernia, by cutting the tendon, the bowels were reduced. In the fourth instance, they found it necessary, after cutting the tendon, to puncture the sac, and cut its neck.

On this proposal, and these original cases, I would remark, that it is an error to conceive that first cutting the tendon, and then trying to reduce the hernia, is a harmless operation; and, if not successful, may be followed by the incision of the neck of the sac. For to free the stricture of the tendon requires a very free cut; and to have after this to cut the sac, makes the whole incision too large.

I have always observed, that when the cause of the stricture was mistaken, the incision of the tendon was particularly large, as in the plate, where I have represented the epigastric artery cut. Now here the surgeon cannot say, until he has cut very freely, whether he has cut enough or not; for the difficulty may be in the sac.

Further, to compress the sac so as to dilate its neck, must be dangerous to the already constricted and injured gut at that part. If it be said, why is there now more injury done to the gut than when the taxis only was employed? I would answer, that

before the incision, the gut was more uniformly supported, and less exposed to injury, now the upper part of the sac is dilatable, while the intestine is held in the neck of the sac; and the same degree of force employed now as in the taxis, must injure the intestine. The difference in the enlargement of the neck of the sac, when it is cut, and where it is distended, without incision of the sac, is, that what the knife leaves undone in the first instance, is completed by the finger or blunt hook.

But, in the operation without cutting the neck of the sac, the stricture is dilated, from the compression of the gut by the hand on the lower part of the sac, distending the gut within the neck or stricture. This distention of the stricture by the gut I conceive to be the objectionable and dangerous part of the operation. You know not how far you may proceed: you know not whether the difficulty be in the neck of the sac, under the stricture of the tendon which you have cut, or further up within the neck of the sac; or whether or not it be an adhesion which is preventing the return of the hernia. You use the utmost degree of force before you can ascertain whether the neck of the sac will dilate or not. It is no argument in my mind, to say—you have done your utmost before incision to return the hernia; why not now?

The fact is acknowledged, in the circumstances of a case which comes to be cut by the knife, that the proper degree of force allowable in the operation of the taxis, has been already applied without effect. Then I find that there is a firm stricture in one half

of the cases which the promoter of this method has given us. There is even, in his estimation, an equal chance that there is a stricture in the peritoneum, which we are to try to undo by this pressure of the gut; and failing, we are to cut the neck of the sac itself. Now, when I turn my recollection to the cases from which the plates representing the bursting of the gut were taken, I remember how easily the gut is injured in the narrow sac of a hernia, when the whole force employed comes to act on that part; and in fairly considering the whole subject, I see more probability of injury than of good resulting from the proposal.

Supposing, however, that in the generality of cases this method of Dr. Monro's were inadmissible, as certainly I, individually, conceive it to be, severe criticism must be converted into praise for ingenuity when we find practical benefit resulting from the original idea. There is a kind of hernia so large, that a very great proportion of the bowels have gradually dropt down into it; and the belly with difficulty receives the returned contents of the herniary sac; and when returned, they cannot be retained. In this case, to open the sac is in a manner to lay open the belly itself; and when by indigestible food and flatus, or congestion of any kind, or by the falling down of a new portion of the gut, a stricture takes place, where perhaps there is also an adhesion betwixt the gut and sac; then has it been found that to cut the bands of the tendon that embraces the neck of the sac, affords a relief to the contents of the sac. The stricture is taken off, and

it

it is better to have an increase of the hernia than to endeavour to return the contents into the belly when they cannot be retained, or to lay open the sac, into which the gut will fall down again and again, notwithstanding your utmost care *.

I cannot dismiss this subject without saying a few words on the subject of peritoneal inflammation, the object of dread to Dr. Monro, from opening the sac.

Dr. Monro imagined, that the peculiar danger of the operation for hernia, was the opening the cavity of the peritoneum, and admitting the air.

Should it ever be proved that the inflammation which destroys the patient spreads from the cutting of the peritoneum, my reader may gather from the introduction how very differently I would explain the fact. But I have never seen an appearance on dissection which could give any foundation for the idea that the inflammation spread from the cut, or that it proceeded from the admission of air. According to my recollection, in every case, the intestine adhered behind the ring in such a way as to preclude the passing of air into the belly (if it were possible that it could in the natural state of the bowels), and to stop inflammation, if it were spreading, from the wound over the belly. I believe, then, that patients die after the operation for hernia in consequence of inflammation already begun in the bowels previous to operation.

* See Mr. Cooper's Work, to whom we are indebted for this operation.

CHAPTER III.

OF FEMORAL HERNIA.

Whoever, says Mr. Pott, examines the tendon of the external oblique muscle, "will find that the part of it which runs obliquely down from the spine of the os ilium towards the symphisis of the os pubis, is tucked down, and folded inwards as it were." Any one looking to the dissected body, and recollecting this introductory sentence of Mr. Pott, will readily comprehend the whole truth, so as to anticipate the novelties of the present day. However Mr. Pott and Mr. Hey may differ in words, I presume they must have meant the same thing in nature. The cord lies in a groove, or gutter-like canal, formed of the lower part of the abdominal tendon, which is inserted broad and horizontally into the os pubis, while it may be described as having two margins, one which is tucked down by the fascia of the thigh, the other internal, and the actual termination of the tendon. So far, then, it seems to me ridiculous in a late author, to claim the discovery of a new process or ligament. Accustomed to direct the knife of the student

student at a very early period of my life, I may, without much assurance, say, that the detail of this matter in my Dissections, p. 111, is still the most accurate. But I thought I was writing what every one knew. The true anatomy is very distinctly represented in plate xiii. A, B, C, System of Dissections; both in as much as regards the tucking down of the round edge of the tendon, by the fascia of the thigh, the broad insertion of the tendon into the os pubis, and the acute internal margin of the ligament. See again this ligament raised, in additional plates i. and ii.

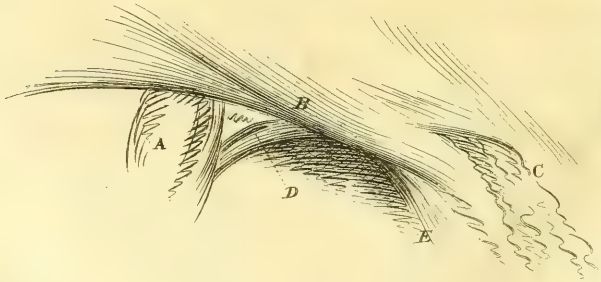
Further, in my remarks on the additional plate of the muscles of the abdomen, in speaking of Gimbernat, Append. p. 5. I have said, the opinion that it is not on the external margin of the ligament that the tension in hernia was found, but more internally, under the ligament, and towards the pubis, is no conceit (as I had then heard it spoken of), but resulting from the natural state of the parts.

To say, however, that the inner margin of the tendon of the external oblique is always, or even most frequently, the place of strangulation, I conceive to be an error; for still I say, that it is the sudden angle which the dilated gut makes with its straightened part in the neck of the sac, which causes the strangulation; in other words, that as the gut and sac rise from the hollow in the top of the thigh, on the fore-part of the tendon of the abdominal muscle, that which produces the acuteness of its turn (the outer margin of the ligament, where it has thrown off its two circular fasciæ) is the part in which

which the strangulation is seated for the most part.

We know that the lower part of the tendon of the external oblique muscle is tied down by the fascia of the thigh; but we know also that the herniary tumour is in truth under the fascia, which is at this place more like the common cellular substance, having thickness from the quantity of fat, and firmness from an intermixture of tendinous filaments.

Fasciæ not only go upwards, on the inside of the abdominal muscles, and on the iliacus internus, as described by Mr. Cooper, but two thin and strong ligaments or fasciæ pass down, the one over the hip-joint, and the other over the os pubis; and these really convert the opening under the Poupart's ligament into an arch; and betwixt these two tendinous membranes, the femoral hernia descends, and is strangulated.



A, The

A, The femoral artery. B, the femoral ligament. C, the ligament of the womb, coming out from the ring. D, an undescribed fascia, which goes down to the bone, and is continued over the joint. E, another ligament on the inside of the space through which the femoral hernia descends.

I conceive that this arch on the inside of the femoral vessels, is the place where the stricture is most frequently found, and round which the neck of the sac turning, the intestine is strangulated.

The femoral hernia cannot force its way downward. Sometimes remaining small, it lurks in the groin, and is strangulated before it forms any considerable tumour; but oftener it is forced up from the hollow, and rises somewhat, so that I have seen it mistaken by surgeons, both of London and Edinburgh, for inguinal hernia.

Taxis.—Knowing the nature of the tendon under which this hernia passes, we see the necessity of somewhat a different intention in the exertion we use in this case, from that which we propose in the operation for inguinal hernia; for while we relax the fascia of the thigh, and the abdominal muscles, we must press the tumour down into the hollow, before we attempt to return it under the ligament. To press it directly into the belly, as it were, or to force it upward, is to push the tumour from the direction in which it must pass to be reduced.

OPERATION FOR FEMORAL HERNIA.

The first incision may pass obliquely from above, inward, passing over the tumour in its length, if it be oblong; reaching a little further than the base of the tumour in both extremities, and proportioned to the thickness of the integuments and size of the tumour.

This done, the tumour has twice presented to me in a very puzzling form. I was operating in the hospital of Edinburgh, in the night; the tumour might be said to rise under the knife (since the more it is dissected the fuller it expands, and the more freely it rises from the depth of its situation), and in this case it presented with a knobby irregularity, and quite destitute of elasticity. My assistants conceived that I had got entangled with a set of diseased glands; but dissecting towards the passage, from under the ligament, I felt confident that I was right, since I traced the neck of the tumour from under the ligament. It was an omental hernia chiefly, having within it a small portion of the intestine. The condensed omentum gave it a firmness, and the sac was studded on the outer surface with the enlarged glands of the groin.

On another occasion, in assisting Mr. Lynn in operating upon a lady, the tumour had a very irregular and knobby form. I should have supposed that the irregularity

irregularity proceeded from the glands; but on pressing these knobs, they were elastic and full of fluid. They proved to be vesicles or hydatids attached to the surface of the herniary sac.

We are reduced then to form our diagnosis from the precise place of the tumour, and from the manner in which it rises, as from under the ligament. This may be felt when the parts are not strangulated. When strangulation and inflammation has taken place, and the surrounding cellular membrane is full, if the feeling is less distinct, the symptoms of obstruction are more marked.

Having disentangled the tumour from the binding of the general fascia of the thigh, we proceed as in the bubonocele, lifting the lamina of membrane with the point of the knife, and pushing the directory under them; at least one complete membrane, besides the proper peritoneal sac, invests the tumour.

Certainly Mr. Pott was incorrect in saying that the femoral hernia is less subject to strangulation than the inguinal. The hernia is often small and runs a rapid course; and as to his opinion, that it may be reduced without cutting the femoral ligament, I believe this is equally incorrect in the general run of cases. I have always found the stricture particularly tight in this kind of hernia.

But in this stage of the operation, we have to recollect the manner in which the tendon of the muscle of the belly is bound down by these fasciæ, which I have described; and we have to wish that the stricture may be here (as I believe it generally is) different from the idea formed of it by Mr. Hey. Because,

cause, if the stricture be on the outer margin of the ligament of the thigh, though it be cut freely, yet the guard against future descent is not weakened; whereas if the stricture be found on the inner margin, and this edge be required to be cut up, it must weaken the guard of the tendon, at a place where there is a perpetual effort made to protrude the bowels.

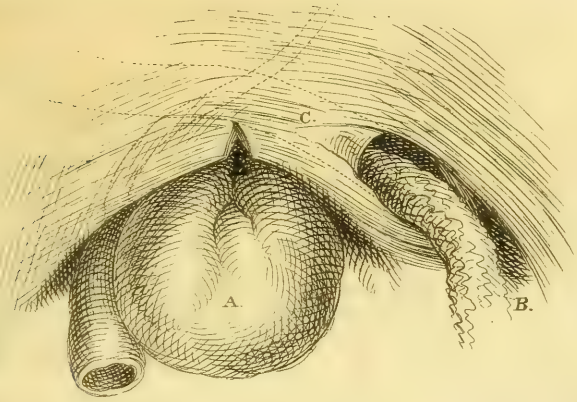
Having opened the sac, then, with the precautions used in the inguinal hernia, we are, with the finger within the sac, to feel for the cause of strangulation, and finding it in the outer margin, endeavour to raise the sac and ligament on the point of the finger, and with the point of the scalpel, to scratch upward from the finger, so as to cut across these firm, tendinous cords.

Now finding that the finger can be introduced, we may feel a stricture within; but from the circumstance which I have already explained, this tightness, though considerable, may not be the cause of strangulation; and by gentle effort, the intestine may be emptied without further incision, and then be reduced.

But let us not conceal the possibility that this internal edge of the ligament of the thigh may be the sole or principal cause of strangulation; and that it must be cut. It is a firm tendon, unlike the cause of the internal stricture of the bubonocele. If it be distinctly felt, cord-like, and running across, the neck of the sac need not be cut, but the directory should be put over the neck of the sac, and the history carried along the directory, until the probe point is

just beyond the margin of the ligament; when by gently depressing the handle of the instrument, the edge near the point rises upon the ligament so as to cut it.

If no more of the ligament be cut than is absolutely necessary, there will be no danger to the epigastric artery or the spermatic cord. Still we should recollect how very near these parts lie to the edge of the knife. This being the situation of the parts—



In this plan, A, is the hernia. B, the spermatic cord. C, the course of the spermatic cord, marked by dotted lines above the ligament. D, the course of the epigastric artery; so that E is the course of the incision; and that it must be straight upwards is evident; neither inclining inward, for we will cut the cord; nor outwards, where the epigastric artery is before the knife.

The

The reduction of the gut, the circumstances regarding the omentum, the dressing, and the precautions after the operation, are the same in this case as in the bubonocele.

OF THE UMBILICAL HERNIA.

The umbilical hernia *(exomphalos)* is very seldom strangulated. If, however, it should, and the gut be included, making it an urgent case, then the young surgeon should be aware of the difficulty of keeping the parts reduced, when the whole tumour has been laid open, and the parts pushed back, as the opening is generally very wide, and compression is with difficulty applied to a soft, yielding part, like the fore-part of the belly, and which is naturally protruded and retracted with every respiration.

We ought not then (if the unpleasant necessity appears) to draw the knife over the face of the tumour, and lay it completely open; but only make an incision semicircularly on the base of one side. Then, with the same precautions of dissecting off the outer lamina, endeavour to get within the margin of the tendon, which being cut by the probe-pointed bistory, the hernia may be reduced, or the last portion of the intestines, which has perhaps fallen into the interstices of the old contents, may be returned. If upon this the large circle of the neck of the sac does not so dilate as to relieve the contents, that part

part of the sac embraced by the stricture may also be cut, so as to admit the finger.

By this operation, the terrible consequence of having a portion of the bowels among the hands, which cannot be reduced, may be avoided.

But this I conceive to be the peculiar character of the umbilical hernia—there is often a predisposition to the disease from the great width of the opening. For this reason, and from the opening being direct, as well as free, it is less subject to strangulation than the other kinds of rupture. Being generally of long standing, and often containing much omentum (from its situation high in the belly), the sac and contents adhere; the sac becomes in places thin, and is even sometimes entirely absorbed, so that the omentum and common external fat adhere*, and the intestine being immersed in a mass of condensed and adhering omentum, it is sometimes confined and strangulated there.

The truss described in Mr. Hey's Surgery, is the best for this kind of rupture.

* See Sharpe's Critical Inquiry, p. 51.

CHAPTER

CHAPTER IV.

OF THE CATHETER.

The occasions of using the catheter are, 1. Most frequently of all spasm of the sphincter muscles, which surround the urethra near the neck of the bladder, in consequence of debauch, or irregularities, or cold. 2. Too great fulness of the vascular tissue which surrounds the neck of the bladder. 3. Paralysis of the bladder. 4. Swelling of the prostate gland. 5. A bruise and extravasation in the perineum, or abscess by the side of the urethra or neck of the bladder.

The first is merely a want of the usual consent betwixt the action of the bladder and the relaxation of the sphincter vesicæ. It is often produced by the necessity of retaining the urine, when there has been frequent inclination to make it. It is this occasion of obstruction which is so apt to yield to the mere introduction of the bougie,; for the withdrawing of the

the bougie, similar to the flow of urine along the passage, restores the consent of action in the bladder and sphincter. This cause of obstruction, too, when it combines with stricture, or indeed with almost any other cause of obstruction, makes the disease unusually complicated.

That fulness of the numerous veins which surround the neck of the bladder, which sometimes follows upon irregularity, and is accompanied and marked by a sense of tension, throbbing, and often with piles, I have often thought to be a principal cause of obstructed urine. In this case, blood is very apt to follow the introduction of the catheter, and this generally procures relief. Yet this is not to recommend general bleeding: bleeding with leeches, and afterwards fomentations, or the semicupium, or bladders of hot water to the perineum and pubes, and the injection of glysters, with warm water, oil, and opium, have the best effect in this disease.

The third cause of obstructed urine, viz. paralysis, is one which it is of peculiar importance for the young surgeon to observe; and with regard to which there have been many very terrible mistakes. It may be produced by any accidental or occasional over-distention of the bladder, by which the fibres being extended beyond their natural length, lose their power of action. The extension of the bladder by three pounds of water has caused it. After the urine is drawn off, the paralysis will continue for weeks, and the bladder recovers its powers very slowly.

The

The best example of the effect of distention, in producing paralysis, and the plainest proof that the action of the muscular coat of the bladder will not be restored while the distention remains, is to be found in women after labour. When the child's head descends into the pelvis, it presses the urethra, and the urine is accumulated in the bladder. The woman, after a tedious labour, perhaps is delivered. But now that the obstruction is removed, the urine does not pass, the bladder has lost its power, and the abdomen is distended as if the child had not been delivered.

The circumstance which most deceives the ignorant, in the paralytic state of the bladder, is that in its great distention there is a dribbling of the urine from the penis, which seems inconsistent with obstruction. The patient now expresses no desire to pass the urine. The attendants express their satisfaction, and their fears are allayed when there is most cause for alarm.

During this insensible flow of the urine, the distention of the bladder still increases, and at last the bladder gives way, and the urine is sent abroad in the peritoneum, and certain death is the consequence.

I have seen what is called the ruptured bladder, from distention; but I confess that I formed a different opinion of its nature from that which is commonly described. I conceive it to be neither a rupture, for then the bladder would be rent, nor a mortification and sloughing, like the uterus

when it is ruptured; or why should it be so very small and circumscribed a hole? It appears to me more to resemble a small ulcerated hole, with black edges; an ulcer similar to that which is formed behind the stricture of the urethra. But here the bladder being distended to its utmost stretch, the irritation produces this ulcerative process in the fundus of the bladder; the most distended and the weakest part. The intestines gangrene from distention; but the appearance is very different from this.

I have in two cases dissected out the bladder of patients dying of suppression, yet in them the bladder was not found full of urine, though much enlarged and thickened. But what was more particular, was the high degree of venous vascularity, and the turgidity of the vessels with very dark blood; and the amazing load of accumulated fat, which surrounded the whole bladder.

The last occasion which I have enumerated of introducing the catheter, is the enlargement of the prostate gland. In this case, the patient is sensible of a tumour, and feels as if the feces distended the lower part of the rectum. The feces are discharged compressed by the tumour. The tumour is distinctly felt by the finger in ano. This disease, peculiar to old men, is the most perplexing and most fatal cause of obstruction of urine.

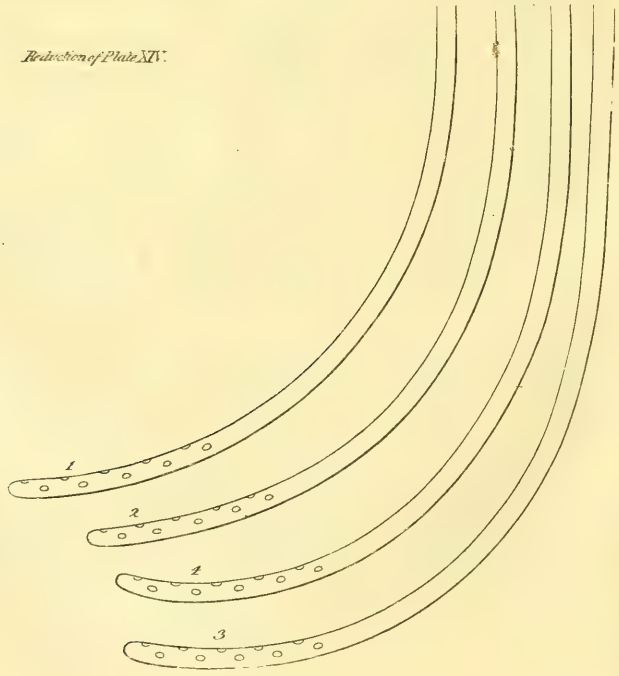
In fistula in ano, when the disease is in its commencement, and inflammatory, the neck of the bladder is sometimes affected, or the sinuses running forward in the perineum, or by the neck of the bladder, compress the passage, and obstruct the urine. Here

the tension and swelling is to be subdued by bleeding, and anodynes, and fomentations, and the catheter if possible to be avoided.

INTRODUCTION OF THE CATHETER.

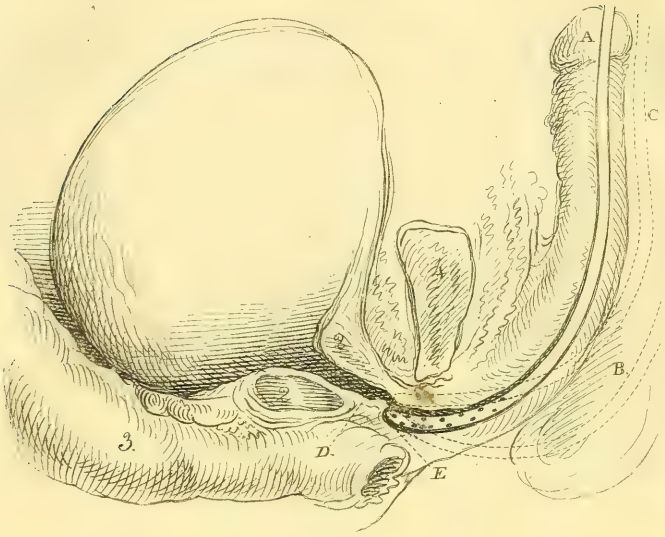
In the hands of a dextrous surgeon, the silver catheter is in general preferable to every other. In the introduction of the flexible bougie, there is little room for knowledge or dexterity: its passage is entirely governed by the canal.

Of the silver catheter, these are the curves which I would recommend—



The surgeon should always be provided with a variety of catheters, with one or two of the elastic gum catheters.

The patient is placed against the wall, or laid in bed, or sitting with his breech over the edge of the chair. The catheter is laid for a little in warm water, then oiled, and held with the wings betwixt the thumb and the fore and middle finger. The penis is held behind the glans, with the fingers of the left hand. Resting the edge of the hand on the belly of the patient, the point of the catheter is introduced into the urethra, with the concavity of the instrument towards the pubes. It is then glided down into the urethra, there being no difficulty nor obstruction until the point passes the bulb which is hung under the arch of the os pubis. Here an obstruction is generally felt, and the point of the instrument is felt to overcome some resistance, like that of a membranous projection. This I conceive to proceed most generally from the point of the catheter lodging in the dilatable sinus of the urethra, before the membranous part, and where the urethra is tied to the arch of the os pubis, as at F, or just before the prostate gland at D. If it proceeds from the first of these causes, then often the mere depression of the handle of the catheter (as B) will not disentangle the point; for the membrane rises with it, and opposes a further barrier to its entrance into the bladder.



The catheter must be withdrawn for about a quarter of an inch, and the whole catheter drawn closer up to the arch of the os pubis, and then carried forward. In this way, it will seldom fail to enter.

Explanation of the Plate of a Section of the Pelvis.

1, The bladder. 2, the prostate gland. 3, the rectum. 4, the os pubis. A, The catheter, introduced into the urethra, but obstructed at E, the handle of the catheter is depressed, so that the instrument comes into the position of the dotted line B; still the point remains. C is the position of the catheter when it is drawn up towards the pubis, when it is to be moved directly onward in the course of the dotted line, until it enters the neck of the bladder. D is another point at which the catheter is sometimes obstructed. See next plate.

What

What I mean is perhaps to be better understood from the plan, where A is the catheter obstructed, while C is in outline the catheter, in a higher elevation, in which it is to be carried forward; while depressing it, as in *B*, often does not succeed. But both ways will of course be tried.

There is a manner of introducing the catheter, which I should have mentioned only with ridicule, had I not seen it practised in London, by men to whom the profession looks up with great respect. I mean the introduction of the instrument with the convex side upward. In objection to the practice, I would offer these remarks.

1. Obstructions to the passing of the catheter, both in a natural and in a diseased state of the canal, are more generally on the lower than in the upper side; and this way of introducing the catheter, with its point turned downward, exposes it to the obstruction of every irregularity. 2. But I believe that, in general, no bad effect results from this manœuvre; for the point of the catheter does not commonly reach the obstruction until it is brought round to that position which it would have had, if introduced in the simple, and I am happy to say the common method. 3. In the description of this operation, it is expressly enjoined, that while we take a large sweep with the catheter, not suddenly but slowly, we must be careful to keep the point steady, and make it the centre of the whole motion; for it may otherwise take a new direction, different from that which it followed before. The question naturally

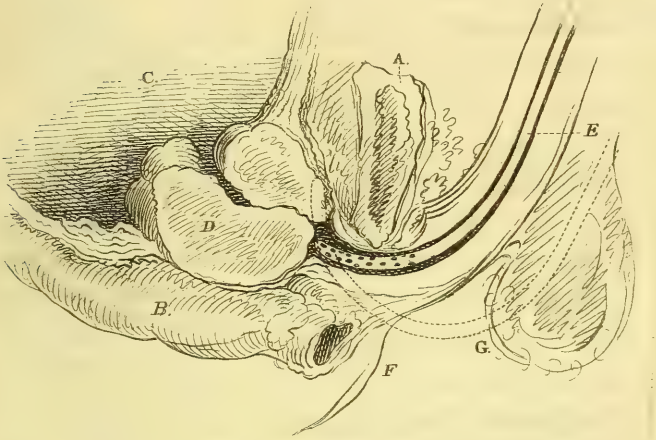
rally arises, why is this turn given to the catheter, if the point is to remain precisely where it was? If this method of introducing the catheter had originally any meaning, further than to make a shew of dexterity, it was surely this, that the turn of the handle might give motion also to the point, so as to overcome the difficult turn of the urethra.

Le Dran gave us the injunction of studying to attain a correspondence betwixt the left hand, which holds the penis, and the right, which holds the catheter: he taught too, that the penis should be drawn upward upon the catheter. It has been observed, that the motion given to the penis cannot reach the point at which the obstruction occurs. It will, however, be found, that by pressing the finger in the perineum, and thus drawing the integuments forward, the course of the catheter is facilitated. But still more will it be possible to smooth the passage of the catheter, and direct its course, if the finger be introduced into the rectum. This last practice is in a peculiar manner necessary, when the difficulty proceeds from enlargement of the prostate gland.

The finger in the rectum informs us of the place, and often of the cause, of the obstruction. It enables us more freely to depress the hand, and elevate the point of the catheter, so as to direct it over the irregular swelling of the prostate gland, if, as it has happened, the urethra be distorted and compressed by it.

If, for example, the gland be enlarged chiefly on the

the lower part* (which I believe it generally is), then the urethra is raised up and elevated beyond the usual level, and the catheter, striking at F, is obstructed.



The hand being now depressed, so as to bring the catheter to the position G, still its point does not enter the bladder, unless, maintaining the footing

* Suppose that there is a section of the pelvis and bladder—

A, is the os pubis.

B, the rectum.

C, part of the distended bladder.

D, the enlarged prostate gland.

E, the catheter, with the point hitting on the fore-part of the prostate gland, at F.

G, the catheter depressed; but still it does not enter.

and

and progress we have gained, the whole catheter be elevated, as in the outline C, and then carried forward horizontally, not in the axis of the curve of the instrument.

It will be in such distortions of the urethra, that the flexible catheter may be used with advantage. We either use the gum catheter without the wire, or we keep the wire in the catheter, and bend it so as to adapt it to the supposed obliquity of the canal; or, lastly, we withdraw the wire of the catheter from about an inch, or an inch and a half, from the extremity of the catheter, which gives some firmness to the instrument, and yet allows the point to be directed by the course of the canal, and to mount over any tumour or swelling which has produced the obliquity. Thus, if the obstruction be of the nature represented in the last plan, or if there should be a tumour or excrescence from that part of the canal where the vasa deferentia open, the catheter with a flexible point will surmount it, and glide into the bladder.

OF STONES IN THE URETHRA.

Stones may often form behind the stricture of the urethra, and prodigiously increase the irritation and the danger. In two cases, I have found on dissection that death was the consequence of a small calculus lodged behind the stricture. The surgeons, in both instances, remained ignorant of the circumstance. It was

was indeed the circumstance of these cases which put me on using the probe or sound more frequently; for by the common bougie, the presence of calculi cannot be ascertained.

In the case of a stone being behind the stricture, to introduce a small probe, and push back the stone a little, allows the urine to flow; and if in this manner the patient can abide the delay, the use of the caustic may so far enlarge the urethra as to allow the stone to escape. But if the symptoms are pressing, and the irritation from the presence of the stone great, it will be better to cut upon it, and extract it.

We may here remark, that if the urethra be opened with the knife, it will quickly heal again, unless there be a stricture before this incision. In this case, having extracted the stone, we must immediately commence our operations against the stricture, otherwise our incision may become fistulous; from the difficulty the urine has to pass by the natural passage *.

Often a small stone lying behind the stricture, by irritating, causes ulceration, and lodges there until it half sinks into the perineum; and sometimes, by slight injury (as the perineum being hurt on the saddle), an inflammation, ulceration, and abscess, is quickly produced, and the stone is discharged by the peri-

* When foreign bodies have got into the urethra (how they get there is not the present inquiry), the urethra may be very freely cut, without danger of fistulous opening being the consequence. That only is occasioned by obstruction to the natural passage.

neum. When it lodges for some time in the urethra, it rapidly increases in size, from the urine passing over it; while it sinks down, and forms a sac, so that if the catheter be introduced, it slips into the bladder, and only grazes over the stone.

If a small stone be passing the urethra, where there is no stricture, it will lodge more frequently behind the bulb, or in the very extremity of the urethra, rather than any other part. Where there is phymosis, or stricture of the preputium, calculi sometimes lodge or are formed within the prepuce.

OF PUNCTURING THE BLADDER.

I SHALL suppose that we are assured there is a total obstruction of urine; that for two days no urine has passed, while the belly is greatly distended, and that it only remains to be determined what manner of operating shall be followed. Two considerations immediately arise; 1. How long ought we to wait? 2. What are the circumstances of the case which prescribe to us the particular operation?

At the end of the second day from the total obstruction, the operation should be prepared for.—While there is life it is not too late: the patient may survive even to the eighth day, without the urine having escaped from the bladder into the abdomen. If there is total obstruction, the fifth, sixth, and seventh days, are those in which the urine may escape from

from the bladder into the belly. *I would puncture on the fourth day.*

When the time of the obstruction is not distinctly marked, or when we are told that urine has flowed, the signs of danger which are to prescribe our conduct are these—The inclination to make urine has subsided; there is less pain; at intervals, during four days, perhaps, he has passed only a pint of water; the belly is hard as a ball; the bladder is felt rising above the navel; the pulse from 90 to 100; the mouth and lips parched, and the breathing quick. If there follows this an oppression of the faculties, hiccup or a low delirium, we may be too late, although the bladder has not given way. I shall suppose every thing else has been ineffectually done, and we delay without an acknowledged motive.

I have said that the 6th or 7th day of the obstruction (allowing a pint of water forced away by the urethra) is that in which the urine generally escapes into the belly, after which all is lost. When this happens, the patient is sensible of something giving way. And during the flowing of the water from the bladder into the cavity of the peritoneum, there is extreme pain and anguish. And now, instead of the hard and regular tumour of the bladder, the belly has become softer, and more generally swelled. The pain has much subsided; but in its place there is more anguish and inexpressible uneasiness.

Previous to the operation we ought to examine by the rectum, having a catheter or bougie at the same time introduced down to the obstruction in the urethra.

We

We have to determine upon the place and manner of operating, and there remains no doubt in my mind of the propriety of doing it by the rectum in preference to puncturing above the pubis or in the perineum.

If the occasion of our performing this operation arise from a kick in the perineum, or an injury from falling upon the perineum, or an obstinate narrow stricture aggravated by caustic, we have little to determine further than whether the swelling, which we feel pressing down the upper part of the rectum, be elastic: of this we must be well assured. We press it, and we feel that it contains fluid*.

But if the obstruction has been nearer the bladder, it may be owing to an enlargement of the prostate

* I have forgotten whether I could feel with my finger in the rectum, the percussion made on the belly by the hand.

gland;

gland; and the surgeon would do well to satisfy himself whether the tumour which he discovers above his finger, be not the prostate gland, instead of the lower bulging part of the bladder. This, if he possesses any tact, he will be easily able to do by attending to the solid resistance of the tumour of the prostate; when, by stretching the finger over it, and pushing it deeper into the rectum, the more elastic bladder will be found beyond it.

If the tumour of the prostate gland be not very large, there is no difficulty in puncturing the bladder through the coats of the rectum. In a case of the largest gland I ever saw, I still prefer the attempt to puncture by the rectum; for I conceive it still to be practicable while we can feel any part of the bladder.

The operation is simply this, having oiled the fore finger of the left hand, it is introduced into the rectum, and curving it upward, the bladder is felt.

Then having the long trocar, proper for this case, in the right hand, (with the sharp point of the stilette drawn within the end of the canula) it is introduced along the fore finger, which is in the rectum. The short stilette is now pushed from its sheath, the canula, and the point of the stilette takes the place of the point of the left finger, which is pressed upon the bladder. It is then pushed into the bladder, in the direction of the gentle curvature of the instrument, which answers to the axis of the pelvis.

Let me not fail to say, that I have seen the puncture

ture above the pubes answer every end, and that it is performed by surgeons whose opinion I value.

Nay, it may be thought advisable after the operation above the pubes, to continue the operations by caustic, on that disease of the urethra which produced the necessity of puncturing. But, in this case, we must be careful that all *tendency* to inflammation in the bladder has subsided.

OF TAPPING THE ABDOMEN.

The ascites is a disease which sometimes brings the question to issue betwixt the physician and surgeon. A patient, with whom the physician have ineffectually tried his skill, is thrown into the hands of the surgeon as a last resource. The surgeon ought not to operate by the will of the physicians, but to judge by symptoms of the propriety of the operation, and the likelihood of advantage resulting from it.

In ascites, the urine is generally small in quantity, and of a deep colour, with thirst, and feeling of heat, there is a frequent pulse, the breathing is affected; upon applying the hand on the belly, and striking it with the other, there is a distinct feeling of fluctuation.

Dropsy of the peritoneum is very often an accompaniment and consequence of debility; a part of a universal dropsy. We naturally inquire, has the

swelling of the belly followed an increasing anasarca, or did the swelling of the abdomen precede the anasarcous swelling of the legs? for the latter may be a consequence of the mere pressure of the former. If the anasarcous swelling of the lower extremities has become a general leucophlegmatic swelling of the body, with paleness and sallowness in the countenance, it is needless to say how much less the probability of success, from operation, has become.

If the habits, countenance, and present symptoms indicate disease of the liver, it is also unfavourable.

There is a diffused inflammation on the surface of the intestines, a consequence of ascites, which forbids the operation.

We next inquire into the origin and progress of the swelling of the belly, to ascertain whether it be an incysted dropsy or not? If the tumefaction of the belly has been generally diffused from the beginning, and when there is a general hydropic tendency, with thirst, and scarcity of urine, it is ascites.

If, on the contrary, a tumour rose at first circumscribed and distinct, and gradually extended upwards and across the belly, it is not ascites; especially if it has begun in the lower and lateral parts of the belly of a female. These symptoms indicate a dropsical swelling of the ovarium. Moreover, we shall find that the disease of the ovarium has been increasing slowly for many years. If there be no general dropsical swelling of the limbs*, and the strength, breath-

* In the dropsy of one of the ovaria, there is often a swelling of the thigh or leg of the same side.

ing,

ing, and appetite, have been little affected, the skin not dry, nor any scarcity of urine, nor thirst, the absence of these symptoms confirm the supposition that it is not dropsy.

In dropsy of the ovarium there is often a very viscid and somewhat gelatinous fluid, which requires a larger canula to draw it off, than in the dropsy of the peritoneum.

The occasion for drawing off the water of dropsical swellings of the belly, is either to give temporary relief from the burden, or to assist the operation of medicines in curing the disease; for, certainly the oppressions of the heart and lungs, compressions of the viscera of the belly, and impeding of exercise of every kind, directly tend to continue that state of the system which originally produced the accumulation of the water.

We have only to consider the connexions of the diaphragm; the relation which is established betwixt the abdomen and thorax; and the effect of the due degree of the tension on these cavities upon the state of the circulation, in order to see the usefulness of compressing the belly during the evacuation of any considerable quantity of fluid. This is never neglected in Scotland; but in London I have seen it very improperly omitted, and the consequence was anguish and fainting of the patient when the contraction of the abdominal muscles came to act feebly on the diminished cavity of the belly.

The abdominal muscles acting feebly, the diaphragm must be also affected. The viscera of the abdomen, and their great veins, wanting their accustomed

tomed pressure and support, the blood accumulates in the vessels. The diaphragm acting feebly, the membranes around the heart are relaxed, the heart wants support, and the blood is accumulated in its sinuses. The blood is not carried with full stream to the brain. There is a fluttering of the pulse, and an immediate sensation of languor and faintness.

To prevent this, there is a bandage for the belly to be had in the shops; but the best support, I conceive to be a piece of flannel, large enough to cover the distended belly completely, and to go twice round the body. The ends of the cloth are then cut up like a bandage, into three or four slips, leaving the middle intire. The middle part of the cloth is put upon the fore part of the belly, and the cut slips go round to the back; the surgeon's assistants take hold of these, and as the water flows, they tighten the bracing of the belly by pulling these ends. When the operation is finished, the ends of the cloaths are put down over the belly, and pinned.

When the puncture is to be made, the bandage is slit. At what part of the belly the puncture should be made, is a matter of some moment. It has been the custom to tap at that point of the belly which is at an equal distance between the umbilicus and centre of the spine of the ilium.

But the operation having been done here, a considerable branch of the epigastric artery has been struck, and the patient has died of hemorrhagy. The trunk of the artery, or its principal branches, being removed from their usual place, arises from the differ-

ence in the action of the lateral muscles of the belly, and the recti muscles. The muscles expand chiefly by the separation of their fibres, because in that direction they have less power of resisting distention. The oblique and transverse muscles resist with power, because they act in the direction of their fibres; but the recti being stretched by the lateral force, allow themselves to be expanded largely over the fore part of the belly. With them, of course, the epigastric artery is extended beyond its usual limits.

One reason for preferring this place in the side for operation, is the convenience of laying the patient recumbent. But this again is necessary, on account of the sickness and faintness chiefly, and by the due compression of the belly, the patient may be placed upright when tapt; and therefore this is an insufficient reason for operating in the side: and be this as it may, London surgeons have of late operated on the fore part of the belly for the most part.

But there is a circumstance attending the change of place, which is not enough adverted to. It is the continued flowing of the water of the ascites, even days after the operation. This is very much more apt to take place when the operation is done in the linea alba, than when done in the side of the belly: and it is highly dangerous; for while the hole in the peritoneum remains open, there is danger of inflammation to the general cavity.

I never have observed this consequence to follow the tapping in the side, because then we pierce through

through a thickness of muscles, which swell up immediately, and close the opening. But in puncturing in the *linea alba,* where there is only firm tendons, which are incapable of the same quick swelling or vascular action as the fleshy fibres are, this continued oozing will follow the operation: and it has even burst out suddenly when the patient has been walking in his room, with such a subsiding of the belly, that he has fainted and fallen very low.

I have, I confess, a repugnance amounting to prejudice against puncturing in the *umbilicus;* besides, that it is subject to the same objection with the linea alba.

I have thought that a round pointed trocar would pass with sufficient ease, after a slight puncture with the lancet through the integuments, and would make less danger of wounding the epigastric artery, and by this means enable us to operate with more confidence in the old place.

If there be anasarca of the integuments of the belly, it is unpleasant to perforate so great a thickness of the integuments as may be produced by the distention of the cellular substance. But by pressure this may be removed. If, with the fingers, we press around the spot where we are going to perforate, we may then pierce the belly with the same accuracy as if there were no such anasarcous swelling.

The surgeon takes the common round canula and stilette, resting the round handle of the stilette in the palm of his hand, and reaching the fore-finger to near the point of the instrument, having just touched

the skin with the bleeding-lancet, to prevent the resistance of the tougher integuments, he pushes the instrument directly inward, the fore-finger being a guard that the point do not start suddenly forward. When the resistance has ceased, and the shoulder of the canula has passed the peritoneum, the stilette is to be withdrawn.

If the distention of the belly be very great, the slower the water is drawn off, the better; and if the patient complains of faintness, common sense teaches us to stop the flow of the water, and lay the patient with the head lower. When the water is entirely evacuated, and the trocar is withdrawn, and the orifice dried, it is simply brought close by a piece of adhesive plaster, which should be supported by a compress of lint, and one of the extremities of the roller, or bandage.

It is possible to mistake a tympanitic state of the intestines for ascites. Some of my pupils have spoken of the dry tapping, as they choose to call it, as no rarity to them. The feeling is so different, though the distinction is not to be described, that I am somewhat astonished at the fact. I believe that in some instances, a diseased state of the ovarium has been mistaken by the surgeon as well as the pupils. Having seen it happen on two occasions, very closely following each other, that, on the surgeon withdrawing the stilette, a very little fluid flowed, and then the canula was stopt; and, by the surgeon introducing the probe, not water, but pelicles of membrane, like the omentum, presented. I resolved,

ed, if possible, to ascertain the nature of the second case, as the woman died. I found that it was a dropsy of the ovarium, which had been considered as an ascites; and that while the distended ovarium filled the whole belly, it consisted of distinct compartments of irregular sizes, and within them shreds of membranes, loose and floating. One of these cells being pierced by the trocar, after discharging a little fluid, some of the membranous-like substance had fallen before the stream, and, hurrying through the canula, had been mistaken for the omentum.

In the ascites of women, we should recollect that there is a possibility of their being pregnant: if of an age, and in circumstances to allow of this suspicion, we should examine by the vagina before deciding on the operation.

What has been said by some authors, of the operation of paracentesis, for air in the cavity of the abdomen, had better be all forgotten*. And as to perforating the intestines for a tympanitic state of the intestine, it has, unquestionably, been proposed in temerity and folly.

OF THE WATER IN THE CHEST.

Water in the chest is a much more alarming, and a more generally fatal disease than ascites. The operation

* In experiments on animals, when air is blown into the cavity of the peritoneum, it is absorbed. So it would happen,

operation of evacuating this is done in very different circumstances from that of the tapping the belly, and the disease itself I believe to be very different. In the belly there may be a partial debility of vessels, and diseases of viscera, which may produce collections of fluid secretion into the peritoneum, without an affection of the immediately vital parts. A disease of the liver, or a debility in the venous system of the membranous viscera, and of the larger glands, may produce the disease without the participation of the heart and lungs in the complaint, or but indirectly. In the thorax it is different. The dropsy must be preceded and accompanied by derangement in the function of the heart and lungs. The distention of the cavities of the pericardium and pleura must further oppress and disorder the function of these important parts; but the drawing off of the water does not relieve them: on the contrary, it must leave a relaxation in the membranes which ought to support the vessels, and the heart's action, and the play of the lungs. It has always appeared to me, that the treatment of the dropsy of the chest was, peculiarly, the province of the physician.

OF THE PARACENTESIS THORACIS.

Though not for water in the chest, yet for matter, it may be necessary for the surgeon to puncture the

pen, if air had escaped from the intestinal canal, and if it escapes by an ulcer, (as I have seen upon dissection) still the operation could be of no service.

side

side of the chest. A collection of purulent matter in the cavity of the chest (EMPYEMA) is formed in consequence of wounds and foreign bodies remaining in the thorax; or by inflammation, as in pneumonia; by the bursting of abscesses or vomicæ in the lungs. Then while there is remission of the more acute pain, there remains dyspnœa and cough, and succeeding to the inflammatory state, quick pulse, fixed pain in the chest; then rigors and more oppression, a teazing cough, and hectic. There is an oppression and difficult breathing in the recumbent posture, and an inability of lying on the side affected.

But the side affected must be distinctly larger than the other. There must be a softness and œdematous state of the skin on the whole of that side, before the operation can be thought of; or, better still if there is a heaving up, and separation of two of the ribs, and a distinct pointing of the matter.

If the matter points thus, there the operation is to be done; but if we adventure on it, where there is only a general swelling and enlargement, the point of election, as it is called, is betwixt the sixth and seventh rib. We may, however, be directed to a particular spot, by the long continuance of a fixed pain there.

OPERATION. We cut directly on the middle of the convexity of the seventh rib, the length of two inches, then drawing the integuments upward, so that the incision is over the intercostal muscles, we continue it through these intercostal muscles, and then taking the trocar, we pierce a little obliquely over the upper

per edge of the sixth rib*. Or the operation is completed with the scalpel, by continuing the incision through the intercostal muscles and pleura, just so as freely to admit the matter to flow; and in this case, it will be necessary to introduce a bougie, or leaden canula, after we have made the incision. But, for my own part, if the matter continues to flow, and this we must expect, I think the canula less likely to produce the inflammatory change on the surface of the cavity, which is the point of danger in the first instance. The discharge continues long, and unless the constitution be good, and the collection entirely local, the patients too often sink at last.

I need here scarcely remind my reader of the anatomy, that when the chest is distended, the diaphragm is pushed down. But though this be the first effect, yet if expectoration of matter has taken place, the cavity of the chest is diminished, the diaphragm rises much higher than usual. So that I have opened a body where it was in contemplation to perform the operation for empyema; and where, if the opening had been made betwixt the sixth and seventh rib, they must have cut into the abdomen more readily than into the chest. In the case of a second opening being necessary, when the first has closed, I should imagine the recollection of this circumstance, and the ready adhesion of the diaphragm to the pleura costalis, when matter has been evacuated, to be of very essential importance.

* The intercostal artery lying in the groove of the lower edge.

CHAPTER

CHAPTER IV.

OF LITHOTOMY.

The best lithotomists whom I have seen operate, have gone to work with anxious feelings. Cheselden confessed that he suffered an anxiety even to sickness, before operating, and until the immediate call upon his resolution and firmness banished all thought of the precarious nature of the operation, and the anticipation of the infinite variety of ways in which discomfiture overtakes the surgeon. For my own part, I have seen many good surgeons operate; but those who have been the most confident, and boasted the most of their uniform good success, have generally failed in some essential circumstance, when I had the opportunity of attending their operation.

Lithotomy is unquestionably the most difficult, and were I to judge by what I have seen, the most precarious operation of the whole circle of domestic surgery.

Yet this opinion of the precariousness of lithotomy is founded rather on the many errors that I have seen

seen committed, than on a conviction that untoward circumstances are unavoidable in this operation. Nay, on the contrary, I have deceived myself if I have not been able to trace such errors to their source; and I hope to point out how they are to be avoided.

Soon after I became a surgeon, fearful of the mechanical apparatus of the grooved staff and gorget, and of the evils I had seen result from it, I preferred operating with the knife. Fear absolutely induced me, in a public operation in the Edinburgh hospital, to lay aside these improved instruments. I doubt not that others attributed to a desire of singularity that which arose merely from the consciousness that as I had often dissected the parts for the demonstration of what should be cut in the operation of lithotomy, I could with the same instrument which I had been accustomed to use, cut the parts which lithotomists had determined should be cut; whereas, if I took the gorget, my experience of the form, the firmness, and the relation of the parts, could have been of no manner of use to me. I must have proceeded by the mechanical adaptation of instruments in which a knowledge of anatomy was of little service, and by which I should have been subjected to the same accidents which I had witnessed formerly.

It is decidedly my opinion, that the knife is the instrument for cutting into the bladder; and if I conceived that the young surgeon were to be guided by my opinion, contrary to that generally adopted, I should have a very short lesson to give here; namely, the manner of cutting with the knife. But

I am

I am writing a systematic work, in which I am bound to consider the common opinion, and the most frequent practice; bound to give my private opinion in honesty, but not allowed to reject that practice which has obtained the most general suffrage.

I have, therefore, to describe the operation with the gorget; to detail how I have seen it prove unfortunate, and how these errors are to be avoided. I shall then describe how I have done the operation, in a boy, and how I conceive the knife is to be used, when the whole operation is performed with the same instrument.

OF THE SYMPTOMS OF THE STONE IN THE BLADDER, AND OF SOUNDING.

The symptoms of stone in the urinary bladder are these—

1. Pain in making water. The pain in passing the urine is of course greatest in forcing out the last drops of urine, when the sensible coats of the bladder contract upon the stone.

2. Often there is a dull pain in the region of the bladder, with an acute and insufferable pain in the glans. The pain is greatly increased after exercise, or the shaking of a carriage. We see the patients coming to an hospital in the greatest torment, from the rough stone jolting in the bladder,

der *, and frequently blood is passed with the urine.

3. Difficulty in retaining the urine. This dribbling of the urine from the bladder is produced by the irritability and painful state of the bladder; these causing a relaxation in the muscular fibres surrounding the neck of the bladder and the urethra.

4. Very frequently when the urine is flowing in full stream, it stops suddenly, without a cessation of the stimulus to evacuation. This arises from the stone falling upon the orifice of the urethra; or rather it happens in this way, that when the bladder is full, and of course distended towards the rectum, as well as in its fundus, as the bladder is emptied, this lower part rises, and lifts the stone opposite to the beginning of the urethra. If the patient be placed upon his hands and knees, while making water, and this sudden stoppage occurs, it is a particularly strong indication of stone in the bladder, especially if the urine flows on changing to the more recumbent posture. Yet this may be produced by a pendulous tumour in the neck of the bladder, or from the prostate gland.

5. A sense of weight and fulness in the rectum, the piles, or the falling down of the gut, often accompany this disease. But they also accompany every disease in the neck of the bladder.

* In which case, it would be consummate cruelty to examine the patient. Let him have the warm bath, and an opiate, and be put to bed.

6. Mucous

6. Mucous sediment from the urine is another effect of stone in the bladder. This proceeds from the excitement of the stone promoting an unusual secretion, to sheath and guard the coats of the bladder. This, however, may proceed also from inflammation in the inner coat of the bladder, or from stone or matter formed in the kidney.

OF SOUNDING AND FEELING THE STONE.

The presence of a concretion in the bladder is to be ascertained by the use of the catheter, or the sound as it is called, introduced into the bladder; and by the finger in the rectum, the size and place of lodgment of the stone is judged of.

The sensation conveyed by the sound, when it strikes or rubs on a stone, though not to be described, is yet sufficiently distinct, and not liable to be mistaken when once it has been felt. There are, however, circumstances which may lead to a very erroneous conclusion. 1. When there is disease in the inner coats of the bladder, if that disease has gone so far as to change the natural secretion of the surface, then sabulous matter lodges there, or concretes upon the surface. The sound grating over this matter may give the sensation of a stone. 2. A stone impacted into the urethra lodges there; or a fistulous sinus by the side of the urethra, allowing the urine to lodge there, a concretion is formed, one point of which perhaps projects into the natural canal

nal of the urethra. When in this case the sound is introduced, the *rub* is conveyed to the hand, and the sensation, as if of a stone in the bladder, is felt.

When the staff, A, is introduced into the bladder, it may happen that the stone, B, lodges under the level of the urethra, and of the course of the sound; consequently we have to force or strike down the convex part of the sound. This lodgment of the stone under the level of the sound, I have found upon dissection.

In this slight sketch it is seen how the finger introduced into the rectum may come to the aid of the sound, and by pressing up the lower part of the bladder, ascertain the presence of the stone, and even inform the surgeon of the size of the stone. To ascertain the size of the stone, I conceive to be a very necessary, though a frequently neglected duty of the surgeon.

It

It may happen that the stone is lodged to one side, dropping as it were by the side of the rectum; when, the sound must be pressed laterally and downward, to strike upon it.

But when there is any lodgment of the stone in a particular part of the bladder, or when at any time there is difficulty in ascertaining the presence of the stone, it is better to use the silver catheter, which, though it do not convey the vibration equally with the steel sound, will yet answer this purpose sufficiently; while it has this advantage, that you introduce it with a full bladder, and feel in all possible directions, and with every variety of posture of the patient. On letting the urine run through the catheter (while it is still held), if a stone be in the bladder, the contraction will bring the stone in contact with the instrument.

Sounds should be formed with various curves; but one less curved than the common catheter will go down behind the neck of the bladder, and touch the stone, when a longer instrument, with a larger curve, may pass over it.

When spasms affect the bladder, and the instrument is closely embraced, and not allowed to move freely, the patient may be put into the warm bath, and when the influence of the bath is on the system, the operation may be done.

THE OPERATION.

I do not imagine that a continued low irritation from the stone is unfavourable to the operation of lithotomy; but it need scarcely be said, that all violence of symptoms must have subsided before the operation be attempted. If there are pains in the kidneys and loins, the operation must be delayed, as new stones may be descending.

Before the operation, by mild laxatives, and natural food (in kind and in quantity) the body should be reduced to the healthy standard, if the patient has been accustomed to luxurious living. If, on the contrary, he has been long exhausted, and the health is impaired by long suffering, he must be recruited by repose and nourishment.

INSTRUMENTS, &c.

The staff, of the size and form with the sound which you have previously used—Scalpels—The gorget—Blunt gorget—A probe-pointed bistory (lest it should be necessary to enlarge the cut into the bladder)—Forceps of various sizes, some curved (and let care be taken that they be well tempered, since I have seen them bent and twisted in the operation)

A scoop

—A scoop for the sand, which may be abraded from the surface of the stone—Sponges and tenaculum —Garters to tie the patient—An injection-bag and pipe, or large syringe, to wash out the bladder, when the stone is lying among firm coagula, preventing the chuck of the forceps against it, or to cleanse the bladder of the broken pieces of stone.—I would recommend also a searcher, made in this form, to ascertain the position of the stone, and to bring it forward if it lie in a sac or depression of the bladder.

Let the surgeon be sure of the adaptation of the beak of the gorget to the groove of the staff. The gorget, I think, should be of a shape to announce its full entrance into the bladder; that is, a little behind the cutting edge, it should be narrowed, and

particular care should be taken that the cutting edge, where it is near the button, or probe-beak of the gorget, do not stand too abruptly off, and that it be extremely sharp at that place. If it should be with somewhat of a blunt, perpendicular edge, to the beak which is to run in the groove of the staff, it must cut the urethra with difficulty, and push the prostate gland before it. That this is possible I have demonstrated on the dead body, by running a blunt gorget in its whole course on the staff, and yet the bladder has not been opened.

If the surgeon has done as he ought, in informing himself of the size of the stone, there will be no occasion for instruments for breaking the stone. I much doubt the propriety of using them.

Let the perineum be shaved, and the rectum emptied by an enema. The terror of the patient, and the irritation of the bladder, may prevent the bladder from being distended with water; yet I consider a few ounces of urine in the bladder as so absolutely essential, that we should ensure it even by tying a soft tape round the penis, when necessary.

POSITION OF THE PATIENT.

The patient is seated on the edge of a strong table; a pillow is under him; then laying him down upon the table, the shoulders and head are supported.

The

The staff is now introduced *: and then the feet and hands are tied together, by putting a noose of tape over the wrist, making the patient grasp the sole of the foot; and then tying the ligature around the hand and foot.

The breech now presented over the table, the surgeon seats himself at a convenient height; and taking the handle of the staff, presses it a little towards the right groin, so that the convexity of the staff is felt in the perineum. The staff is now given to the assistant, who holds it firm in the position in which he receives it, having the thumb of the left hand over the head of the staff, and the scrotum supported by the right hand.

In regard to the staff, there is one thing more, particularly to be attended to, viz. that by the assistant's carelessness the point of it be not brought out of the bladder, and made to rest in the neck of the bladder. Be sure, then, that by elevating the handle of the instrument, you can push it smoothly onward in the bladder.

If you were to cut, while the point of the staff rests in the neck of the bladder, when you had fixed the gorget in its groove, and you were about to thrust it

* If the sound, without a groove to direct the hand, should be introduced, as I have seen, the consequence is terrible if the surgeon cannot operate with the knife. For when once the urethra is laid open in search of the groove, and none found, the sound cannot be withdrawn, and the staff introduced. It is at least more apt to pass out by the cut into the urethra than into the bladder.

forward, and at the same time to carry the staff farther into the bladder, ten to one but the staff would not pass easily, perhaps not at all. Then withdrawing the gorget, and still endeavouring to pass the staff, its point might be carried through the slit you have made in the urethra!

Now the surgeon must have calculated all the bearings of the anatomy, and especially felt the prominence of the ischium; and he would do well to remember that the margin of the bone reaches somewhat more inward than the prominence which he feels. By the surgeon not attending to this, I have seen the pudic artery cut.

FIRST INCISION.

We are directed to begin our incision on the prominence of the staff, and, cutting through the skin and integuments, to carry it down between the verge of the anus and the ischium, or somewhat below the ischium.

But this does not correspond with my idea of the proper incision. In the first place, I do not approve of the staff being held so far to the left side of the perineum, nor of its being made to bulge out so much. I let it remain in its unconstrained position; then making it be held firm, cut down to it, making an incision towards the fore-part of the prostate gland, not as if searching for the staff.

This

This cutting for the staff, and having no other object than to prepare for the beak of the gorget entering the groove of the staff, is the conception of the merest tyro. Our object, in the first instance, is to lay the perineum open, in sufficient extent for the extraction of the stone, and to unbridle and cut across the muscles which support the perineum.

The sharp point of the knife ought to be made to pierce directly in towards the lower part of the arch of the pubes; and it should enter by the side of the spongy body of the urethra (or, in other words, by the side of the staff), and betwixt that body and the crus of the penis. From this, with a deep, steady incision, it is carried down directly betwixt the anus and tuberosity of the ischium, and ending opposite the lowest part of the margin of the anus.

Now, we are told that a small incision of the skin impedes and embarrasses the surgeon in the extraction of the stone. But this first cut cannot do effectually what is required in the *first incision,* as it is termed. The accuracy of this outward cut is of importance only as it naturally leads to the full separation of the muscles, which are truly the cause of any embarrassment, the skin always yielding sufficiently.

One or two successive strokes of the knife deepen the wound, and the surgeon must be careful that he carries the knife from the side of the staff down by the side of the rectum, and that he cut through the transversalis perinei muscle. But even this is not sufficient;

sufficient; and by experience, as well as by observing the difficulties of surgeons, in circumstances where I could not interfere, I well know the forceps are checked when this is thought a sufficient incision. But when the surgeon cuts through the transversalis perinei muscle, and turning up the edge of the knife slits the urethra, and fits the gorget in the groove, and then carries it forward to the bladder, the instrument passes over a very strong fasciculus of muscular fibres, which afterwards, in extraction of the stone, strongly binds up the instrument, and forcing it against the arch of the pubis, throws the stone off the grasp of the forceps. There are few lithotomists who have not experienced this: they call it the slipping of the stone. They seize the stone again and again, with increasing violence and desperation.

This muscle, the deep transversalis we may call it, so little attended to, I have thought it necessary to represent in an adjoining sketch; as I have attributed many untoward accidents during the operation to the neglect of it.

In cutting through this muscle, the operator must carry the finger of the left hand into the lower part of the wound, and press down the rectum, else it may be wounded *. He must continue his incision until he feels the prostate gland, and that there is no stric-

* When the rectum is cut, it generally heals; but sometimes the wound degenerates into a fistula. Though it is easily cured, it is truly a fistula in ano.

ture

ture on the wound below, from the crossing of the flesh.

CUTTING THE URETHRA.

If the staff has been kept hitherto nearly in the middle, it must be now inclined with the handle to the right groin; so that the convexity of the instrument may appear bulging in the wound of the perineum. And now the surgeon merely turns up the edge of the knife, and cuts freely and decidedly into the groove of the staff. Here he can do no mischief*. He keeps the nail of the fore-finger of the left hand in the groove of the staff, until he takes the gorget from the pocket of his apron, or the ready hand of the assistant, and fixes the beak into it.

* I am satisfied, that of ten operators whom I have seen operate, nine have cut into the bulb of the urethra. There is no great harm in this; only, that when not aware of it, they make too small a cut into the urethra; they find the beak of the gorget does not enter upon the staff; they cut a second time and again, and then the young surgeon, perhaps thinking too much of what others are thinking of him, becomes ashamed of his awkwardness, and makes at last a desperate plunge with the gorget, imperfectly fixed in the groove. The effect is terrible; for the gorget does not enter the bladder. Whoever has doubts of his finger being fairly in the groove of the staff, let him slit up the urethra freely; the only bad effect is the escape of a considerable portion of the urine.

OF THE GORGET.

Directed by the finger of the left hand, the blunt point or beak of the gorget is introduced into the groove of the staff. It is made to grate upon the rough groove*.

Now, the surgeon rising from his seat, and secure of being in the groove of the staff, carries the gorget onward, recollecting the convexity of the staff, and that he has to carry the gorget in the axis of the pelvis, not directly onward. He moves slowly at first, until he see the urine trickling over his instrument, when he carries it more resolutely onward, lest the urine escape altogether from the bladder. The gush of urine announces the completion of this incision.

I have twice seen the gorget driven between the bladder and rectum. On the dissection of one of these cases, I saw no wound nor sinus between the bladder and rectum. This, for the time, puzzled me, until frequent operations on the dead body gave me examples of what had occurred. The gorget had not gone off the groove: it had only not cut the neck of the bladder, it had pushed the prostate gland onwards upon the staff, and had not pierced the neck of the bladder, nor the prostate gland. This, with bad instruments, and in the relaxed state

* There ought to be a slight roughness in the groove, or the polish ought not to be given to it; for I have found that the very high polish makes us less easily distinguish the staff from the surrounding parts.

of

of the parts in the lessons on the dead body, is particularly apt to happen. To guard against it, the cutting edge of the gorget, near the point, must be extremely sharp, and very oblique. The edge penetrating in any degree, ensures the complete incision. The shoulder, which is made on the side of the beak, opposite to the cutting edge, seems to serve no purpose but, if possible, to thrust the beak from the groove of the staff, and make the surgeon plunge it betwixt the bladder and rectum*.

Now, the usual manner of proceeding, is to withdraw the staff almost instantly, and as if finishing the manœuvre of the gorget. But if any one look to a contracted bladder, and then to the sharp gorget, he will see that there is a danger of the bladder being cut upon the gorget, if the instrument be left in the bladder until the forceps be introduced. I think that the gorget should either be immediately withdrawn, or the staff left as a guard upon the edge of

* The gorget ought to be of that breadth in the sharp edge, that it may cut through the left side of the prostate gland. If the prostate gland, and the stronger fibres of the sphincter vesicæ be completely cut, the wound of the bladder will enlarge to transmit the largest stone. But if the base of the gland be not entirely cut through, there will be a bridling and stricture on the forceps. As the gorget is uniformly of one size, (and, indeed, cannot be made broader without endangering the cutting of the pudic artery) it has the fault of not entirely cutting through the prostate gland and neck of the bladder. In operating with the knife, in place of the gorget, the incision can be adapted to circumstances.

the

the gorget; or the gorget withdrawn, and the staff left.

Though I acknowledge that it is contrary to the advice of some celebrated surgeons, for my own part I would advise the gorget to be withdrawn. The forceps can, without a directory, be introduced at first, as they too often are many succeeding times introduced in operations where some circumstances prevent the immediate extraction of the stone. If the incision be well performed, nothing will prevent the introduction of the forceps; and I conceive the staff to be a better directory than the gorget, if any directory were required.

Further, if by cutting too small a part of the bladder, the forceps were not easily introduced, when we had withdrawn the gorget, then we have the blunt gorget, which being put into the bladder, will, at all events, carry on the forceps without the danger of the sharp gorget remaining in the bladder at a time when it suffers such extreme excitement and must, of consequence, strongly contract.

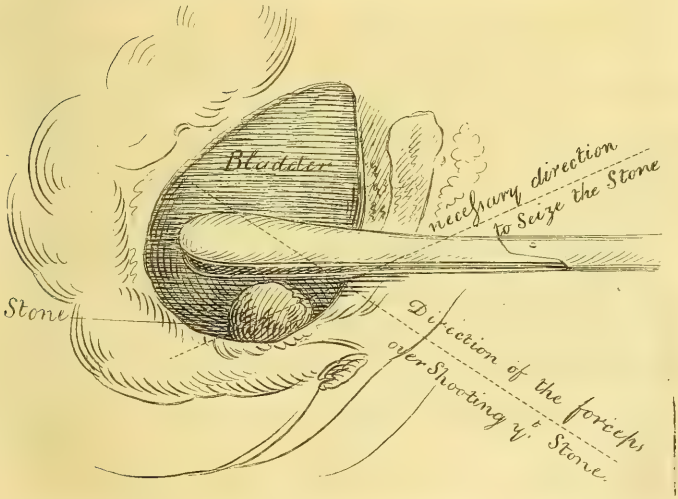
When the gorget is withdrawn, it should be pressed towards the right side of the perineum, that the edge may not make a second incision.

OF THE FORCEPS.

When the forceps are introduced, the surgeon should not immediately begin, with both hands, to separate

separate the handles of the instruments, and to dive and chuck for the stone; but endeavour to feel for the stone with the forceps closed, and ascertain its exact position before he attempts to seize it.

When the surgeon is grasping for the stone, and cannot even make the stone sound till he has overshot it in the manner here represented, he must raise his hands, and point the instrument almost perpendicularly down into the lower part of the pelvis. Now, perhaps, he



touches the stone, and still cannot grasp it. A very little knowledge of the parts, and experience of the difficulties of the operation, inform even a spectator of what is going forward. In this difficulty, with most distressing feelings, I have seen an operation continue

continue for an hour, when, by putting the finger into the rectum, and raising the lower part of the bladder, all difficulty of grasping the stone would have vanished.

When the operator cannot with ease and perfect certainty introduce the forceps either at first, or in the second or third attempt, he ought to use the blunt gorget, and be sure that he touches the stone with the forceps, without any intervening substance; for it has happened, that the operator has sometimes pushed the side of the bladder before his instrument, and along with the stone seized the side of the bladder betwixt the teeth of the forceps.

We not unfrequently see a surgeon pressing the forceps deep into the right sinus, and hitting upon the stone, then it escapes into the left side; he follows it there, and thus trifles in ineffectual, yet painful endeavours. This notion of sinuses of the bladder, by the sides of the rectum, is a mere deception. There are no such cavities. When the surgeon turns the handles of the forceps to the right side, and the blades, of course, deep into the left side of the pelvis, and then again into the other side, in the same manner, he is not moving the instrument in the relaxed bladder; but the bladder is contracted about the stone; it is moveable in its place; it is carried upon the end of the forceps!

This I have ascertained. After seeing this changing for some time, I have put my finger into the bladder, and found it closed (but soft and wrinkled) about the stone, and accurately adapted to the form of the stone. To seize the stone in this situation, it

it is only necessary to extend the blades of the forceps, which, stretching the bladder, the stone comes to occupy the space betwixt the blades; and, on closing them gently, the stone will be found there. If this stretching of the bladder in one direction does not succeed, another direction will.

I would observe further, that the forceps are ill-fitted for ascertaining the exact situation of the stone. When there is any difficulty, it is better to take such a sound as I have represented, and put it into the wound, then we can touch the stone, and, if necessary, raise it from its cavity, if such there should be, and bring it forward.

Coagula of blood will often confound the operator—for the blood has run backwards into the bladder, and, filling, it surrounds the stone, so that the forceps close upon a soft mass. In these circumstances, withdrawing the forceps, we wash out the bladder with the syringe and tepid water.

But sometimes it happens, from the transverse muscle, or levator muscle, not being sufficiently cut in the external incision, or from the gorget not having cut through the prostate gland and the firmer fibres, which form its sphincter, that the stone cannot be extracted. The violence used is great. The cries of the patient bear testimony of that violence.

In this case, the surgeon should introduce his finger into the wound, and feeling that either in the lower part of the wound there is a firm bracing of the flesh, or that the incision of the bladder has a stricture, as it were, which does not yield and dilate, the incision must be enlarged. If the stricture be

in the muscles of the perineum, the scalpel must be used to cut across the fibres, while the rectum is pressed down with the fore-finger of the other hand. If the tightness be in the bladder, the probe-pointed bistory is to be introduced, so as to enlarge the incision of the neck of the bladder laterally.

When the stone is firmly held in the forceps, it is then to be slowly extracted. We cannot fail to observe, that it is impossible to stretch the wound upward, for there is the arch of the os pubis; and again and again I have seen it happen, that the surgeon not aware of this, and pulling directly outward, the stone projecting above the blades of the instrument, strikes against the bone of the pubis, and is pushed off into the bladder. And if the stone is very firmly held in the grasp of the forceps, the urethra is very apt to be torn.

The handles of the forceps are therefore, when this difficulty occurs, to be depressed by the side of the anus, or upon the gut. There the parts yield, if they have been properly cut.

If, having a firm hold of the stone, we find that it does not come easily through, we pass a finger along the blades, to examine whether the length of the stone is not across the blades of the forceps. If it should be so, by holding the stone less firmly in the grasp of the forceps, and pushing one end of the stone, with the point of the finger it may be brought into the more favourable direction for extraction.

When the stone is large, and the incision have been made as large as has been safe, and yet it is retained by the forceps with difficulty, I have again

and

and again freed the patient from the continued pain of ineffectual efforts, by introducing my two fingers into the rectum, raising the stone, that the forceps might have a good hold of it, and then assisting the forceps in extracting it, by pushing the stone forwards through the incision; and when the forceps have slipt here, still the stone did not fall into the bladder: it was already in the passage, and I held it there. I have seen a patient, in a public hospital, destroyed by the long continued exertions of the surgeons, merely because they were not aware how manageable the stone is with the fore and middle finger of the left hand in the rectum.

When the stone is large, the forceps (though they do in a wedge form make way for the stone) are not to be pulled directly outward, but to be used as the accoucheur does his forceps, by movement from side to side. Bringing down one blade, it is to be retained in its position, and then by a sweep of the handles, the other is to be brought down until the parts dilating the stone is extracted.

If the stone be brought out rough on all sides, it grounds a *presumption* that there is no other stone; but it is no *proof*, and we should feel again in the bladder. If there is one side of the stone smooth, and the other rough, it founds a strong presumption that there are other stones. We must recollect that it is most dangerous to leave a stone in the bladder after the operation of lithotomy; for the inflammation produced by the incision is increased by the continued irritation of the stone, and will destroy the patient; whereas, if relieved from the irritation of

of the stone, the parts suffering less from the operation, would soon recover.

If the stone is broken, we apply the parts together, and see that we have got them all; and when the softer surface has broken down under the forceps, we must be careful to wash the pieces away with the syringe, or bag and pipe, by injecting several times into the bladder; and, with the finger, examining that no considerable portion remains.

In museums, I have certainly seen urinary calculi, lying in sacs formed in the coats of the bladder. But they must be very rare. I have never chanced to see any thing like this in operation. Indeed, these sacculated stones must give very little inconvenience, and not call for operation. But I have often seen errors and mistakes lead the surgeon to the conviction that his difficulties proceeded from something of this kind.

That stones may adhere, I know; but this is the nature of that adhesion. Mr. Lynn, in performing this operation, laid hold of the stone, and brought it down with some difficulty; but with great uneasiness, he found that he had inverted the bladder, and that the stone adhered to it. He turned off the stone from the granulation on the inner coat of the bladder, as the stone of a ripe peach is turned out of the pulp, and reduced the bladder. He carried the stone to Mr. Hunter, as a proof against his opinion, that living parts could not attach themselves to inanimate matter. Mr. Hunter gave it as his opinion, and convinced him that this was a stone formed on the fungus excrescences

excrescences of the bladder, and, in consequence of the disease, not a stone adhering to the bladder.

A bit of oiled lint is put upon the lips of the wound, the thighs are bound slightly together with a soft tape, and the patient is carried to bed. Under him the cloths are placed as for a woman after child-bed. Now, an opiate is usually given*.

The urine is, for the first fortnight, passed through the wound. Often, however, on the second and third day, it is passed by the urethra. This is merely owing to the tumefaction of the rising inflammation, and it is better when it passes only freely through the wound. Towards the end of the fortnight, the urine should pass by the urethra, and in a perfectly successful operation, the parts should be healed in three weeks.

The violence of the operation, without hæmorrhagy or inflammation, I have seen kill the patient in about ten hours. The continued pain and violence of the operation is too much for the nervous system to bear, and the powers of life are destroyed before they are assaulted through the vascular system.

The first rising of high inflammation, is a period of danger to life. When the system is suffering directly under the pain and violence of the operation, there is an incessant vomiting or hiccup. The warm bath, with large opiate clysters, I conceive to be our chief resource. Though I know that when the bowels

* The dressing is very simple, all our care being to dress mildly, and to see that no lodgment of urine or matter be allowed by the side of the rectum.

can be moved in that low irritability of the stomach, it relieves this most alarming symptom.

When the inflammation does actually attack in an alarming degree, we must be resolute in bleeding repeatedly. We blister the belly largely, use the warm bath, and gently move the bowels, give blisters, &c.

HÆMORRHAGY.

We ought to turn our attention to the quantity of coagulated blood which lies under the table before dressing the patient. The question that naturally occurs is this, whether is the quantity of blood such as to indicate the cutting of a main artery? and the loss so great, that in the event of a return of the hæmorrhagy, the patient's life or health may be in danger?

The blood must flow either from the *transversalis perinei,* or from the *artery of the bulb,* or from the trunk of these the *internal pudic.* The first of these is always cut; the second too often needlessly, and yet it is not easy assuredly to avoid it; the last is often cut, and the patient dies. Three of our first operators have each, within the last year, lost a patient by hæmorrhagy: yet this is the most inexcusable cause of failure of any.

1. The transversalis perinei must be cut, because it runs directly across the course of the incision: it supplies the muscles and fat of the perineum.

2. The artery of the bulb is a large artery, it need not be cut if we make the course of our incision for the fore-part of the prostate gland, not for the bulb, which

which I have ventured to say, is the part most generally cut, in all its length. The artery goes twisting under the ramus of the pubis, and dives deep into the bulb of the urethra. Sometimes it passes across so low that it must be in the course of the incision. I think I have seen this artery cut in a boy, and cause fatal hæmorrhagy.

By pushing the knife too directly into the angle made by the bulb of the urethra and the ramus ischii, this artery is struck. If it shall still be the object of the lithotomist to cut for the membranous part of the urethra directly behind the bulb, he cannot avoid cutting this artery; but if he dissect for the face of the prostate gland, and pierce the membranous part of the urethra just before the gland, he may avoid it. When I have seen this artery bleeding powerfully from the penis, I have thought of its importance when cut near its division, from the more superficial artery in the perineum.

It is, however, most necessary of all to observe the occasion of wounding the trunk of the internal pudic artery. It may be done either by the knife in the first incision, or by the gorget.

When the surgeon is fearful of wounding the rectum, and keeps too near the tuberosity of the os ischii, or when he mistakes the feeling of the protuberant part of the bone for the inner margin, and does not calculate how much nearer the inner edge, and consequently the internal pudic artery lies to the anus, than the centre of the tuberosity is which he feels through the fat of the hip, he is in danger of cutting this artery.

To avoid the trunk of the arteries, then, we must take the anus as our direction, and keep near to it. If the finger be introduced into the anus, we shall find the gut contracted, and we may cut close upon the coats of the gut; nay, some have kept the finger in the rectum, to make this incision more securely*. I have said too, that the bulging part of the staff should not be thrust so far aside; it serves no purpose but to distort the parts, insure the surgeon's cutting into the bulb of the urethra instead of the membranous part, and making him cut nearer the bone than necessary.

In pushing in a broad gorget, unless the staff be made to yield towards the right side, so that the gorget may come more into the centre of the arch of the pubes, the trunk of the internal pudic artery is in great danger.

As in other operations, the surgeon should judge by the first jet of blood, and by the direction and size, what artery he has to deal with. If the blood springs with force from the side of the wound, and upon feeling there you find that you are nearer the bone than you imagined, let the artery be taken up by the tenaculum before proceeding.

When the operation has been tedious, all bleeding from small branches will have ceased. If the bleeding continues after the operation, it is not a trifling artery.

* The rectum is generally cut in the deep part of the incision; and it is to be protected by pushing the rectum downward, and to the right side, with the fore-finger of the left hand.

It

It is not so much during the operation, or when the patient is on the table, that the danger of hæmorrhagy is great, as when it returns three hours after, or on the evening subsequent to the operation. This second hæmorrhagy added to the loss of blood during the operation is too much, and the patient cold and pale after it, sinks. Sometimes a third slighter hæmorrhagy proves fatal.

If the blood flows from under the arch of the pubes, still the compression or tying of the same vessels commands it. If the bleeding shall not seem to demand the needle, there is a canula, which being wrapt round with lint, or passed through a piece of sponge, may be introduced into the wound; by pressing against the os ischii, it stems the bleeding from the lesser branches of the pudic, while it allows the escape of the urine. The patient must be kept cool, and with the precaution recommended in the introduction.

If there be pain, tension and fullness in the bladder, some little time after the operation, it may be full of coagulum, which both excites the bladder and retains the urine. The finger may be gently insinuated, and then the injecting bag and pipe used to inject some tepid water into the bladder.

OF THE OPERATION AS PERFORMED IN THE WESTMINSTER HOSPITAL.

Mr. Lynn and Mr. Carlisle have of late practised the operation of Frere Cosme. I wish that gentlemen of

of less knowledge and ability in their profession, had revived this operation. The same errors I still conceive are apt to be committed in this manner of operating, which were proved to have attended that of Frere Cosme. The operation has certainly the advantage of simplicity, and of the mechanical way of operating; there is in this, the least fear of not getting into the bladder. A staff of the common kind is introduced into the bladder.

The first incision is made in the common way; the urethra is cut in the same place, and in the same manner; but instead of the gorget, the *bistouri cachée* is introduced along the groove of the staff, into the bladder.

The staff is then withdrawn. The bistory is then taken in both hands, and turned so that the edge of the knife shall present to the left side of the bladder, and the spring being so pressed, that the knife rises from the groove, in which it has lain concealed, the instrument is in that state and relation to the bladder withdrawn with one uniform continued pull.

The incision is here made into the bladder in the common direction, and it is intended to be the same extent. The operation is conducted in all other respects as the operation with the gorget.

The objections made to the operation of Frere Cosme stand in full force here: and these have been often set forth in sufficiently dreadful array. It has the advantage which was claimed by the supporters of Frere Cosme, the dexterous and the awkward, the ignorant and the anatomist, may perform it with equal security;

security; but still with equal chance of doing mischief.

1. The urine is apt to escape before the incision is made. This multiplies the danger. For then the knife being raised and spread in the bladder, and drawn thus out, it may cut up the whole side of the bladder. If the knife be raised, and the incision not immediately made, the contracting bladder must be particularly in danger of being cut upon the sharp point of the knife. If the knife be adapted to cut the prostate gland, and a very little of the neck of the bladder, on the supposition that the bladder is distended, it will cut more than sufficient if the urine has escaped.

Further, in operation with the gorget, it is possible to turn the edge obliquely downward, in adapting it to the groove of the staff, so that its edge is not made to run along the bone; but with this instrument before the incision of the neck of the bladder is made, it is drawn up to the bone, and when the knife is drawn out, it must come close upon the side of the bone. It is, therefore, particularly apt to cut the internal pudic artery.

To avoid the artery in this operation, formerly they lifted the knife too little, and the consequence was, that they had to introduce it, and pull it through again and again, or that the forceps were thrust in with difficulty, and, of course, were grasped with firmness by the neck of the bladder.

Lastly, the surgeon is in great danger of cutting the rectum by this unguarded drawing of the instrument,

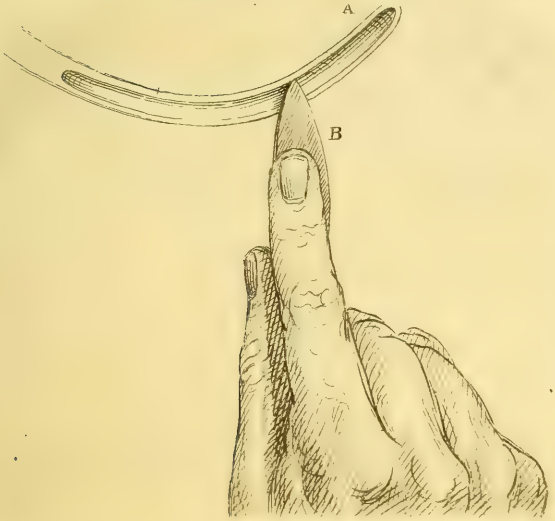
ment, as happened to Frere Cosme, and those surgeons who then imitated him.

OPERATION OF LITHOTOMY WITH THE KNIFE.

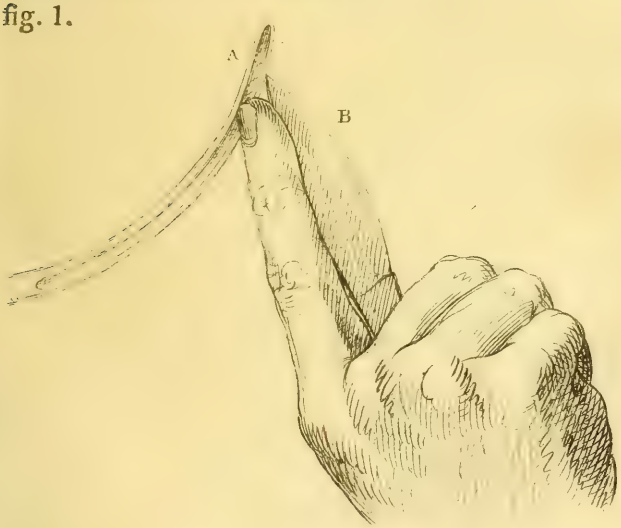
Instruments.—A staff, grooved on the right side —A scalpel, with a straight back—The common lithotomy forceps. These three instruments are all which should be required; yet the operator would choose to have all which are occasionally necessary in the operation with the gorget.

The staff is kept in the centre, and well home into the bladder. The surgeon, making his incision under the arch of the pubes, and by the side of the anus, carries it deeper towards the face of the prostate gland; cutting near to the staff, but yet not cutting into it, and avoiding the rectum, by pressing it down with the finger.

Now, carrying the finger along the staff, the prostate gland is felt. The point of the knife is run somewhat obliquely into the urethra, and into the lateral groove of the staff, just before the prostate gland.



The knife is run on in the groove of the staff, until the urine flows. The fore-finger follows the knife, and is slipped along the back of it, until it is in the bladder; and this is the position of the knife. fig. 1.



Having carried the fore-finger into the bladder, it is kept there, and the knife is withdrawn; then, directed by the finger, the forceps are introduced into the bladder.

If the stone is not readily caught betwixt the blades of the forceps, the finger is passed into the anus, which, lifting up the lower part of the bladder, the stone is put within the grasp of the forceps, and assisted in its exit, if it be of great size.

This I conceive to be the best way of performing lithotomy; but I have done it in a boy in the following manner.

Having placed him in the usual position, and the staff being introduced, I put the fore and middle finger of my left hand into the anus; then striking down the staff upon the stone, I felt it with my fingers, and brought it forward towards the perineum, and to the side of the staff.

I now made my incision in the usual place; but instead of seeking for the staff, to cut into it, I cut directly on, through the left half of the prostate gland, on the face of the stone. Making thus a fair incision upon it, I thrust it through the wound, by pushing with my fingers in the rectum, as if in the action of bending my fingers. The boy was only three minutes and a few seconds on the table, and was entirely recovered in three weeks: yet this is not an operation which I would do again. The stone slipt from my grasp; and the bladder is not easily

easily cut against a rough stone. I believe, too, though this boy never had a bad symptom, that the sphincter of the neck of the bladder ought always to be cut in the operation of lithotomy.

CHAPTER

CHAPTER VI.

OF AMPUTATION OF THE LIMBS.

I SHALL here according to my usual manner, introductory to the operation, give a short sketch or view of the diseases which are the occasions for operating. Of the accidents and diseases requiring amputation, it is a very difficult matter to give a short account; and indeed the time has been when I could have given a more decided opinion than I can at present venture to deliver. Sure I am, that the general enumeration in systematic writers is such as will greatly mislead.

One of the most important points settled in surgical books, is, that amputation is dangerous in a robust frame, or system in full health and vigour; and that this danger is increased, wherever there is inflammation, such as that which follows a severe accident.

cident. On the contrary, that there is little danger in the operation, when performed on a subject exhausted by irritation, and continued discharges from ulceration. Perhaps the explanation is this, that where the system has been long accustomed to a low degree of action, the tendency to high inflammatory action, is subdued; so that when the source of the continued irritation is taken away by operation, the body is left in a state susceptible only of that due degree of inflammation from the effect of the knife, which is proper for producing a cure; the general inflammatory action being low, and the nervous irritation having subsided.

But when I say this, I must also bring to my readers recollection those tremulous stumps which he must have seen in hospitals, formed of a great sac of loose skin, from the centre of which is presented a long dead bone. This is in general the effect of the great exhaustion and debility in a constitution already so much reduced, that there were not powers to produce adhesion, or to enable the patient to go through the stages of healthy suppuration.

When the leg is amputated in this situation, it is like the operations we perform in the dissecting room. The muscles and skin are soft and loose, and do not take upon them a due degree of action; or they separate from the bone, and leave it dead, with the parts in the state which I have described.

I must present another picture to my reader, that of a man dying from amputation in the heyday of health and full action. There follows not high inflammation, nor the flushed face and delirium of

fever; but the shock given to the system, through the nerves, and particularly affecting the stomach and the brain, carries the patient off before the third day. He sinks from the time of the operation; while we are accustomed to find a wretch who seems exhausted by long disease, sleep soundly on the night of the operation, for the first time, perhaps, during many months, and gradually revive and gain strength from the time of the operation.

I must say, however, that I have not seen this fatal effect of amputation; and of the friends whom I have consulted, all have the conviction of the danger, but none have given me instances in their own practice.

In common practice, amputation is performed ninety times in a hundred, for ulcer with carious bones, and for white swelling of the joints. The evidence of this necessity is the sinking of the strength under the irritation of the disease, when all our resources have been tried in vain.

But there are cases in which the most experienced surgeon will have difficulty to determine whether amputation will save the patient or accelerate his doom. These are cases of fractures, aneurisms, and gangrene. Our surgeons in the best practice have, I believe, laid aside the idea of amputating in cases of compound fracture. Fracture of the bone has never in itself been properly the occasion of this operation, nor even when complicated with a simple wound of the soft parts, either from the blow or from the ends of the bone piercing the integuments. It is only when the parts are irrecoverably bruised, that

that you amputate immediately; where the bones and flesh are crushed flat. But even here it is not the fracture; it is the bruise, and the general injury which decides. The reason of amputating in these cases is this, the parts cannot recover, and presently the whole system begins to sympathise with the debility of the part injured; so that not only that part falls into gangrene, but such a similarity of action pervades the whole body, that you cannot afterwards cut off the limb. If you do attempt to cut it off, the stump will exhibit the same alarming symptoms of gangrene with the original wound. It is therefore upon the general injury, compared with the powers of the constitution, and particularly on the bruising and laceration of the parts, that we have to fix our attention, not on the mere fracture of the bone. We should have two objects in view; to save the limb altogether, or at least to preserve it so long that suppuration may be established, and the system accustomed to diseased action, and so reduced as to acquiesce in a moderate and safe degree of inflammation, when amputation is performed.

When we are apprized how soon the general state of the system influences the state of a sore or wound, and that the converse of this in many instances holds true, viz. that an active local disease induces a prevailing similarity of action in the system at large, we learn to be cautious of amputating in the active state of the disease. Violent inflammation we must restrain and subdue, before we amputate; and even gangrene must have stopped before we can promise success to the operation.

For if this gangrene be spreading from the place originally affected, the general system is already influenced, and the new injury you are about to inflict in the regular form of an operation, is not the less on that account an injury on which the tendency to gangrene will operate. The gangrene will appear on the stump *.

The next difficult question to be settled, on the instant of an accident, occurs in the complication of wounded arteries, and broken bones; or in gunshot wounds, or when joints are laid open.

A fracture apparently the most dreadful, when seen first, with the limb distorted, and the bones sticking out, and which we are tempted to condemn, does yet, when reduced, lose its frightful aspect; and often by bringing the parts together, we can procure adhesion of the skin, and reduce it to a simple fracture. But when a great artery is at the same time wounded, when operations deep in the flesh of a limb, and amongst broken bones, are necessary—the case is altered; we cannot reduce the fracture to a simple form. Here also we gain a point, how-

* When gangrene has seized a limb, the limb generally lies an immoveable mass; and when the gangrene has been stopped and cured, still it lies immoveable; and often by its insensibility the effect of the pressure on the projecting processes of the bone, as of the heel or ancle, or head of the fibula, destroys the skin, and makes the bones carious. From such a cause, I have seen it necessary to amputate a limb; when otherwise, the gangrened parts being of small extent, would have sloughed off.

ever,

ever, if we can save the limb for a little; although suppuration, and a discharge too profuse for the system to bear, is to be the consequence; for then amputation will be safe.

It may in this case happen, that we are enabled to tie the artery above the part wounded, which reduces the wound to a simple compound fracture, if I may use the expression; and if in any way we can restrain the hæmorrhagy, and check the rising inflammation, we ought to defer amputation.

Perhaps the accident the most fully licensed for amputation, is where the knee-joint is laid open with fracture and lacerated integuments. The inflammation of this great joint is in itself pregnant with danger, and will produce fever and irritation to a most alarming degree. But if these consequences may arise from a mere puncture of the joint, we have nothing favourable to expect from a shattered state of the limb and knee-joint. Yet in this very instance we must confess the insufficiency of these general rules, since a ball has passed through the knee-joint, and the limb has been saved.

As important an observation as I know for the young army surgeon, is, that he take care in operating for gun-shot wound, with a shattered tibia, that the fissures of the bone do not reach up into the joint; for in this case there will be inflammation of the joint. It is better in all cases of doubt to amputate above the knee.

But I refrain from further remarks on the general question of amputation, suspecting that they may be to my readers not more satisfactory than the ad-

vice which I myself have received from books. The reason of this unsatisfactoriness is, that each case, as it occurs in practice, is attended with circumstances so peculiar, that it will seldom class with our general aphorisms; and frequently in the discussion of this subject, the first surgeons are left in doubt and perplexity. The question of amputation is not to be discussed, I conceive, in a separate dissertation. It will always remain to be determined by our general knowledge, by the consideration of the effect of age and constitution, and of the powers of the system, on the peculiar circumstances of the case. Our decision must be the result of our combined knowledge, of the symptoms of constitutional affections; of the effect of circumstances on the constitution or disease; of the effect of disease on the local injury; and of the probable effect of the operation. At any rate, the question embraces so extensive a range of the principles of pathology, that it is foreign to the object of this little work to enter fully into the subject.

CHAPTER VI.

AMPUTATION OF THE THIGH.

INSTRUMENTS AND APPARATUS.

Two tourniquets—Roller and compress—Flannel or linen roller—Adhesive straps—Lint-compresses for the stump, and Malta-cross laid out—Tow—Sponges—Tenacula, three at least—Dissecting forceps—Needles—Ligatures—Cloth retractors—Amputation-knife—Scalpel—Saw--Amputation-forceps—Wine and water.

The patient is seated on a firm table, with a friend behind to support him in his arms. Attendants are on each side of him to take hold of his hands, while another is seated before him on a low stool, to hold the injured limb. The assistant surgeon applies the tourniquet; and in general, in a great operation,

he settles all the lesser previous circumstances; at the same time assuring the patient, and fortifying his faith in the surgeon.

The tourniquet is applied about a hand's-breadth from the groin. The pulsation of the artery is felt, and the compress put down upon it, and seated there by one or two turns of the attached bandage. On this the tourniquet is applied.

The errors which I have seen committed in this simple and previous step are these. A young gentleman put the roller and compress which is placed under the tourniquet so tight, that the circulation of the artery was not free after the tourniquet was unscrewed, and on the compress being taken off, blood started from the face of the stump. The tourniquet on another occasion was put on with the screw half elevated, and during the operation the moveable piece reached the top of the screw, so that it was impossible to tighten it farther. A young assistant, mistaking the first jet of blood from the distended veins for the springing of an artery, put his whole strength to the tourniquet, until the strap tore upon the buckle. It might have broken it altogether, as happened to Gooch, from this over-anxiety. I have seen a surgeon apply the tourniquet with the buckle so near the brass roller, that it checked and prevented the operation of the screw, or the further tightening of the ligature.

During operation, I have seen the arterial bleeding taken for venous blood, and a loss sustained that destroyed the patient; and therefore I have sometimes recommended, where there were great veins,

to

to put a fillet, very tightly drawn, about the limb, below the place of the incision, which keeps the operation altogether free from blood, and informs the assistant whether he ought to tighten the tourniquet: any jet of blood, then, in the first incision, is not from the distended veins, but the arteries.

It may be said, that the colour of the venous blood is a sufficient indication of its nature; but in experience I have found it otherwise. I have again and again, in this operation, as well as in the extirpation of tumours, seen the patient lose arterial blood to a dangerous extent, while it was thought that it was only venous blood.

Where there is a suspicion of abscesses having formed amongst the muscles, the tourniquet ought to be applied, as far removed from the disease as possible. Should the tourniquet give way, or the tongue of the buckle slip, the mere idea of which is alarming, the assistant should press his thumb upon the artery, as it escapes from the belly, whilst some one grasps the face of the stump until a new tourniquet be applied, or a handkerchief twisted about the limb, as described in the introduction.

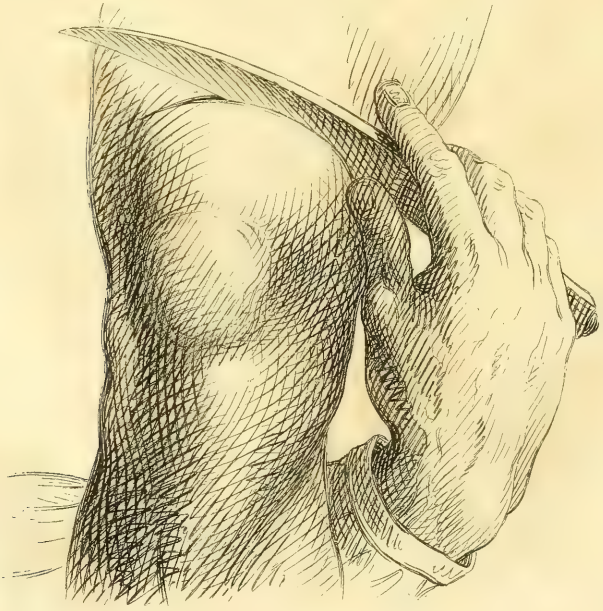
In this amputation, it is of no consequence on which side the surgeon stands. The operative assistant ought to be opposite to him. He may grasp the limb, but ought not to draw up the integuments during the first incision.

The

The FIRST INCISION is to be made low in the thigh, but free of all diseased skin; and, if possible, avoid cutting over a sinus or abscess. I have seen an amputation in which the matter spouted out on the first incision!—a bad suppurating stump of course followed.

We may announce the general rule thus; if the inflammation has been of no peculiar kind, and be not at present active; if it has left only a little thickening of the integuments, when the disease was not originally cutaneous, nor likely to become so, circumstances may occur to tempt us to make our incision in the thickened and somewhat inflamed integuments. I have seen no bad consequences follow the practice.

To make the first circular incision, the knife is thus held—

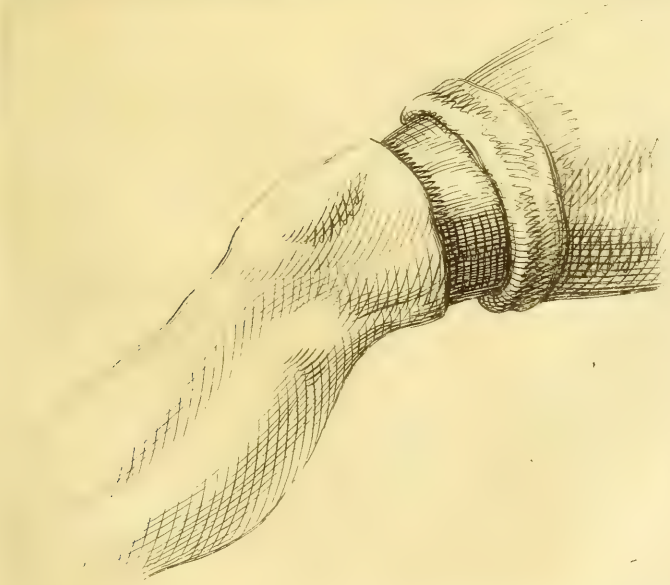


The

1. The arm is carried under the limb, till the knife reach almost round to the same side on which the operator stands. With one sweep penetrating to the fascia, the knife is brought round to the point where it first touched the skin. The meaning of this is, that the cut is more regularly done than by cutting first on one side and then the other; and the patient is saved some degree of pain, where the operation is most painful, in the cutting of the skin.

During this incision, the assistant should not draw up the skin, else he will make it uncover; he should only steady and fix the integuments.

2. The large knife is laid aside, and with the scalpel the integuments are separated from the muscles and fascia, the assistant pulling the integuments strongly upward at the same time. The integuments are then turned up thus—



3. The

3. The surgeon taking the amputating knife again in his hand, and placing it close to the inverted integuments, cuts down to the bone, and carries his knife round with one sweep, as in the first instance

In doing this, he must carry his eye before the knife, that he may not cut the integuments, of which there is a possibility. But if the assistant does his duty, the surgeon cannot do so awkward a thing were he blindfolded; for the assistant taking a slip of linen betwixt his hands, and putting the edge of it close upon the muscles, on the under part of the thigh, he protects, at the same time that he draws the whole circle of the integuments up. Some surgeons amputate after making the integuments to be merely drawn strongly up, without dissecting them from the muscles, or turning them up.

4. When the muscles are cut through, the assistant takes his split cloth, or piece of canvass, and passing the slips on either side of the bone, he twists the extremities a little, and pulls the whole flesh upwards, thus:

The

The surgeon now clearing the surface of the bone a little, and pushing up the cloth and soft parts, applies his saw close upon the retracted parts. There is no other precept to be given in regard to the sawing of the bone, than to carry the saw very lightly.

During the sawing of the bone, the assistant or pupil, who holds the leg, must keep very steady; if he raises the limb, he checks the motion of the saw; if he lets it drop, he will splinter the bone.

5. The surgeon now proceeds to tie the arteries: first he pulls out the femoral artery from its sheath, by

by the inside of the bone, (if the limb be amputated at the usual place) and ties it. Then, on the outside of the bone, he seeks for the larger branches of the profunda femoris, and finding these, he requires the tourniquet to be slackened, that the blood may flow and shew the others.

The considerable branches of the arteries are to be sought for in the cellular interstices of the muscles. Sometimes the main artery shrinks so into the sheath of the triceps, that it does not bleed or shew itself readily, in which case the sheath is to be cut open, when the mouth of the artery is discovered.

The number of vessels taken up in general, is from five to eight; but if the artery has been in high action, or aneurismal, many more vessels may require to be tied. In making a deep plunge with the tenaculum, either for the femoral artery or some of the lesser arteries, we have to avoid drawing in the extremities of the nerves. I may say that the nervus cutanous longus, is very often taken in with the femoral artery. This, if attended with no worse consequences, will certainly occasion many severe and tedious dressings to the patient, and will often destroy the healthy state of the stump.

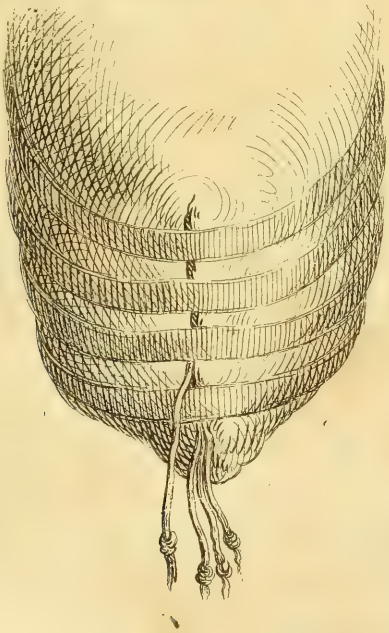
6. Before we bring down the muscles and integuments over the end of the bone, we feel if its edges be not rough; if no sharp points project: these we cut off by the amputation forceps.

7. The tourniquet is now to be entirely removed. The integuments being put lightly together, the operation finished, and nothing painful remaining

ing to be done, the patient should have a little cordial, be raised, and encouraged. A delay of a few minutes now may shew that a little oozing, which may happen to make its appearance, is, in fact, the bleeding of a considerable artery which begins to act and give out blood when the patient has become revived and hearty.

The integuments are now sponged as dry and clean, as may be, the muscles pressed forward to close over the bone, and the skin brought down over the surface of the muscles.

8. The integuments are brought together from either side, thus; and the greater number of ligatures brought out by the lower angle.

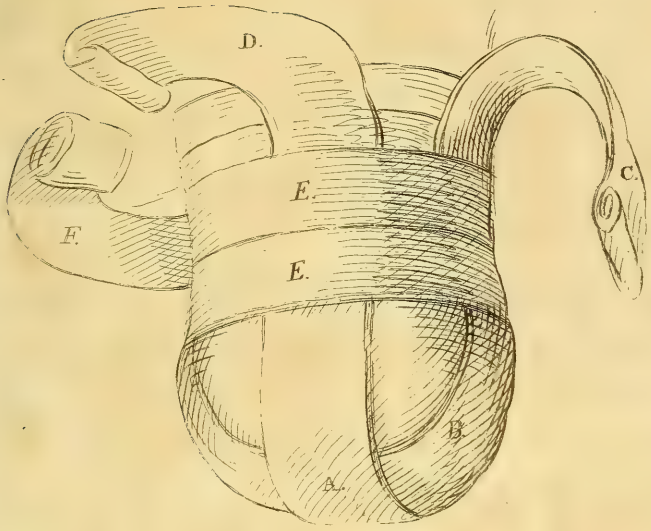


9. As

9. As in so great a wound our desire must be to procure hesion quickly, the chief nicety in the operation of amputation is in the dressing. The surgeon compresses the face of the stump with a dry cloth, to suppress in this way the slightest oozing, and keep the skin dry for the application of the adhesive straps. The assistant having heated his adhesive straps, brings it, and fixes it on one side of the integuments, the surgeon with a motion of his finger (still keeping the flaps together) fixes it over the lips of the wound, while the assistant stretches out the other end of the strap over the face of the stump, and upon the thigh. Four or five of these straps bring the integuments accurately and neatly together.

Over this we place a web of scraped lint, with some smaller soft dossils; over this some fine tow, betwixt the folds of a piece of old linen, so as to make an elastic cushion.

Lastly, the whole is retained by the malta cross (two pretty broad slips of linen, joined across each other) which is thus applied over the dressing, the



malta cross, or cross slips of linen, A, B, C, D, are applied. The flannel roller put once about the waist, and pinned up previous to the operation, is ready to be brought down and rolled upon the thigh towards the stump. When it covers the thigh within a hand's breadth of the stump, the ends of the cross slips of linen, D, C, are put down bound by the remaining turns of the roller E E. The slips D, C, are now drawn in due degree and pinned down.

The tourniquet is put loosely about the limb.

The patient is to be carried to bed, and laid on a mattrass; the stump laid on a soft pillow, or bedded in soft tow or cotton. It is then pinned down to the bed by a broad piece of linen, and a cradle is put over

over it, to keep from it the weight of the bed-clothes.

Until the third day from the operation, we have nothing to do but to consult the feelings of the patient. Some uneasiness must be expected; but unless there be twitching, or spasm, or much restlessness, I should avoid repeated opiates. There may be tightness of the dressings, and pain from the binding, which may induce us to remove a few turns off the roller, or ease the ends of the cross bandage on the face of the stump, or there may be an oozing, which may cause us to draw them a little tighter, or to keep the pupil in waiting more narrowly on the watch; but ten to one that nothing of this kind will be necessary until the third day.

But even on the third day I would not take off the intire dressings, nor apply a poultice to soak the dressing. Let the roller be undone, and the compresses be taken off, so that the degree of redness in the flaps is seen; but if all is right, no unusual softness, no great degree of tension and swelling, and drawing of the integuments upon the adhesive straps, the further exposure of the wound is unnecessary. The dressings may be put on again with somewhat of a slighter degree of compression.

The dressing on the fifth day should be complete: every thing may be now removed. If the moisture of the wound, and the suppuration has not been sufficient to soften and loosen the dressing, a large poultice may be put on for an hour, after which the dressings come easily off.

When the stump is exposed, we expect to find the integuments adhering to the parts below, and, perhaps, in part, at their edges. We feel and press gently on the integuments, that no collections of matter may lodge under them. If matter has been collecting, we put a soft compress over it, so that when the bandage is put on, the sides of the little cavity may be kept in contact. The adhesive straps are now put on, so as to cover the integuments where they were left bare in the first dressing.

The dressing of the stump is, after this, a daily duty: and, on the fifth dressing, we may gently solicit the ligatures from the lesser arteries.

CHAPTER VII.

AMPUTATION OF THE LEG BELOW THE KNEE.

FIRST OF THE COMMON OPERATION BY THE CIRCULAR INCISION, A FEW INCHES BELOW THE KNEE.

The change necessary on the apparatus, is only the addition of a catiline knife, the adaptation of the dressings to a smaller stump, and the retractors slit so as to form a slip for passing betwixt the tibia and fibula.

The tourniquet is now to be placed a little above the knee, with the pad or the compress betwixt the ham-string tendons.

The patient and assistants are placed as in the last operation; but the surgeon stands on the inside of the knee.

1. The circular incision of the integuments is made, (about two hands' breadth below the patella) and

+ Lucius Sergius Catiline

and the skin folded back, and separated from the tibia and the muscles on the back part.

2. Unless the calf of the leg be very fleshy, a large scalpel will serve to make the second circular incision; or the catiline may be rather used, by which means both the circular incision around the bones, and the cutting of the interosseous ligament, and the notching of the periosteum for the saw, may be done with the same knife, and, of course, with less interruption.

3. In the sawing of the bones of the leg, there is somewhat more caution necessary than in the sawing of the thigh bone. The meaning of the surgeon standing on the inside of the leg, is that he may rest the stress of his saw on the firmer tibia, and while he is making progress in cutting through the tibia, the fibula is at the same time cut through. Unless this be done, the latter is very apt to be splintered.

4. In the face of the stump there is a better mark by which to find the mouths of the arteries, than in that of the thigh.

The anterior tibial artery, lying before the interosseous membrane, and betwixt the extremities of the bones.

The fibular artery, lying behind the fibula.

The posterior tibial artery, lying to the inside of the last, and among the fibres of the soleus, near the tibia.

These must all be secured. The lesser branches, which require the ligature, are—that small artery behind the tibia which gives off the nutritious artery, and the muscular branches on the outside of the

gastrocnemii, and in the substance of the gastrocnemii and soleus.

5. The dressing in this operation is much the same as in the last operation.

But unfortunately the great size of the tibia, and the thinness of the integuments over the fore-part of it, makes it somewhat of a more precarious operation than the amputation above the knee. We must be particularly careful in applying the adhesive straps and bandages, that the skin be not pressed against the sharp edge on the fore-part of the tibia. The neglect of this precaution, with the great size and superficial situation of the bone in the stump, is frequently the cause of a tenderness and suppuration in the skin, and too often that of a caries of the bone.

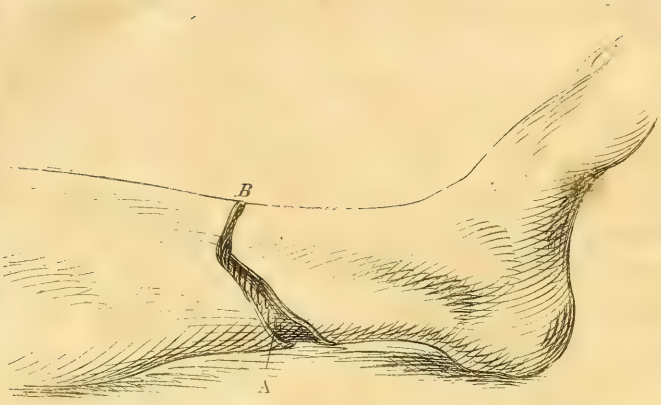
CHAPTER VIII.

AMPUTATION NEARER THE ANCLE.

When the disease is in the foot, it is better to amputate lower in the leg, where the bone is smaller; yet not so low but that there may be sufficient muscular substance of the soleus and flexor muscles, to cover the face of the bones.

Whether we perform the flap operation, as it is called, or not, still here we must contrive so to manage the knife that there may be a sufficient length of muscular substance (and of integuments to cover that muscular substance) to admit of the back part of the flap being brought forward over the face of the bones.

The FLAP OPERATION may be thus performed—



1. With the large amputating knife, we make an oblique cut upwards, through the skin of the back part of the leg. The assistant drawing up the skin, we enter the knife again at the upper margin of the cut, A, and carry it obliquely upward until it reaches the bones. The knife then (without being withdrawn) is to be carried in a circular direction, B, over the tibia and fascia, which covers the tibialis anticus, until it meets the angle of the first incision, on the outside of the limb.

2. The assistant continuing to pull the integuments up, the surgeon takes a sharp-pointed scalpel, and pierces the interosseous membrane, and separates the periosteum from the bone.

3. The sawing of the bone being made with the same precaution as in the last instance, and the arteries being secured, the flap is brought up upon the face of the bone, and the point, A, meets the integuments, B.

Thus,

Thus, if adhesion be procured, or if the flap connects itself after suppuration, a cushion is afforded to the ends of the bones, and the patient may probably be able to bear his weight upon a false leg and foot, by which he has the use of the joint of the knee.

The method I have here described, I prefer to that manner of operating in which the catiline is thrust down behind the bones, and then made to cut its way out obliquely downward, so as to form the flap.

The vessels to be taken up are still the same, nearly, as has been already mentioned. The posterior tibial artery and the fibular are very near each other. The tibialis postica in the interstice betwixt the tibialis posticus muscle and the flexor digitorum. We have to guard against hooking out the nerve along with it. The fibular artery lies near the fibula, and betwixt it and the flexor pollicis magnus. The tibialis antica is before the ligament, under the extensor communis, and betwixt the tibia and fibula.

In the dressing of the stump, the same precautions are used to bring up the flap over the face of the stump, and to support it by straps, by an elastic cushion of lint and tow; and yet to be careful that the flap does not press too much or unequally on the ends of the bones.

OF THE AMPUTATION OF THE TOES AND FINGERS.

The amputation of the metatarsal bone of the great toe may be necessary, or that of the metatarsal bone of the little toe; but I conceive, from what I have seen of the pain and difficulty of extracting any of the intermediate metacarpal bones, and considering the effects of such a torturing and tedious wound among the bones and ligaments of the foot, that it should not be performed.

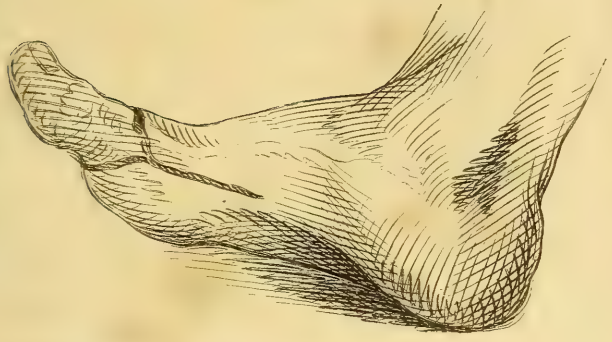
But instead of a formal operation, under the head of amputation, I have no doubt that the careful and nice extraction of the spoiled bones from the hand or foot, in caries, should be oftener done than it is.

In the amputation, where the surgeon endeavours to dislocate the square head of the metacarpal bone, the patient is kept long in extreme torture, and the diseased bone is generally broken in the surgeon's fingers. On one occasion, a patient (though certainly in a very unfavourable state of health) died in consequence of the operation, from the immediate nervous irritation. Instead of dislocating the head of the bone, it is better to cut it with the trophine. I have adapted the instrument, fig. 2, for this purpose. It cuts only on one half its circle.

When the metatarsal bone of the great or little toe is to be taken out, the incision is to be made thus. 1. First, we carry the scalpel round the root

of

of the toe (a), and then down the side of the foot (b).



2. Then the flaps are to be dissected back: the metatarsal bone of the great toe is to be separated from the next, by passing the knife betwixt them; and now, notching upon the square head of the metatarsal bone, where it unites with the tarsus, we may press it down and unfix it.

The tendons must be cut short so as not to lie exposed in the wound.

3. The artery which bleeds on the fore-part of the foot, is the extremity of the tibial artery, where it is passing betwixt the head of the metatarsal bones of the great toe and the second toe. The lesser artery in the sole, is the internal plantar artery.

4. The arteries being secured, the flaps are simply brought together, and secured with straps, compresses, and a roller.

The

The amputation of the toes and fingers is done at the joints, and the manner is this—

1. Instead of the simple circular incision, a slightly semicircular incision is made on both sides of the joint, the angle of their meeting terminating over the middle of the joint.

2. Dissecting these flaps slightly from the joint, and pulling the skin upward at the same time, we cut above and below, and then bending the finger to ascertain the middle of the joint, we cut down on the lateral ligaments of one side of the joint. This gives the head of the bone freedom; and upon cutting the ligament on the other side, the finger is separated.

3. As the arteries are generally in an enlarged and active state from the disease, they may require to be tied. It should be done with the dissecting forceps. If the skin has been neatly cut, it requires only

only to be put together with one adhesive strap, and the hand bound up.

AMPUTATION ABOVE THE ELBOW.

This is the most simple operation in surgery. It is performed with the double circular incision. If we take care sufficiently to secure the main artery, freed from the radial nerve, and bury the end of the bone well in the flesh, no bad consequence can follow, but from some strongly prevailing evil tendency in the habit.

AMPUTATION OF THE FORE-ARM, BELOW THE ELBOW-JOINT.

The amputation of the fore-arm below the joint is generally done by the double circular incision. This attempt has a peculiarly awkward effect in the hands of the young surgeon. I prefer making an incision of the nature of a double flap.

When we grasp the fore-arm, we feel the spine of the two bones running quite superficial; and on the inner and outer sides of the arm, we feel the mass of flesh of the two classes of muscles, the flexors and extensors. On these muscles must we depend for covering the face of the radius and ulna; and we obtain more of them by making a semicircular incision on the inside of the arm (making a flap

flap of the flexor muscles), and another meeting the first at the extremities of a gentle curve through the extensor muscles.

By dissecting these two flaps up a little, and sawing the bone deep, we get a good mass of flesh to cover them, and we have the advantage of retaining the skin in adhesion to the muscles.

Four arteries will be tied—the radial and ulnar; and a lesser one on each side of the interosseous ligament.

In dressing the stump, we must, as in every case of amputation, be careful to avoid pressing the soft parts against the extremities of the bones, until they are somewhat rounded by absorption; and yet much of the success of the operation depends on the equable degree of support which is given to the stump.

CHAPTER IX.

OF THE AMPUTATION AT THE SHOULDER-JOINT.

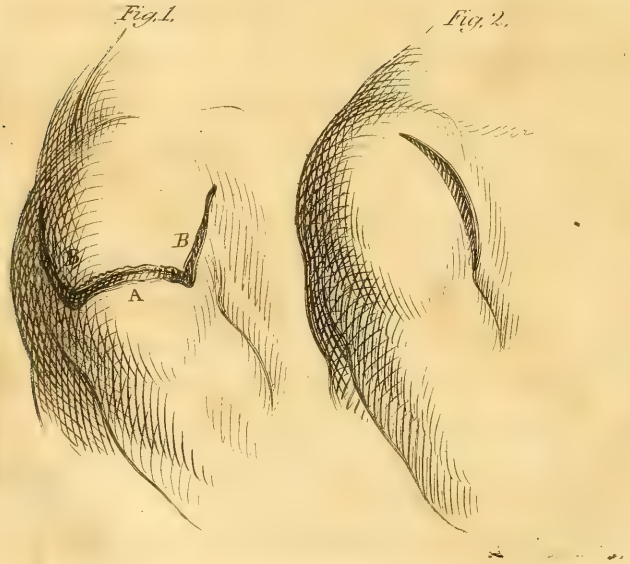
The arm is amputated at the shoulder, in the case of gun-shot wound, with shattered bone and torn artery; or where both the axillary nerves and artery have been cut through; or where the caries of the humerus perpetuates a wasting disease (but this latter case will seldom occur); or, lastly, where the upper part of the arm has been bruised and flat, and the bones broken by a waggon-wheel, or machinery.

Le Dran tells us, that before his time the method was to strike a strong curved needle through the flesh, on the inner and under part of the arm, about three fingers breadth below the arm-pit; to lay a compress on the part, and then to draw the ligature so as to include this compress. This secured the artery until the end of the operation; when the head of the bone being separated from the scapula, the artery

artery was secured by the needle, and then the parts beyond, and the cord of nerves were cut through.

Le Dran's incision was made in this manner: He made a cut across the middle of the deltoid muscle, a little below the joint: an assistant raised up this flap, and the second incision went through the capsule. The assistant now turned out the head of the humerus, while the surgeon, using his finger of the left hand as a director, carried the incision down on either side, until the mere cord of vessels and nerves, and part of the skin on the lower side of the arm, was left. This part was cut through last of all, and the artery secured.

Others have performed the operation in this manner (La Faye)—



Making

Making the incision, A, across the shoulder, a little further down than in the last instance, two incisions, B B, are carried down to it, in the direction of the fibres of the deltoid, from the top of the shoulder, so as to convert the massy part of the deltoid muscle into a flap.

Sharpe performed the operation in this manner (as in fig. 2.)

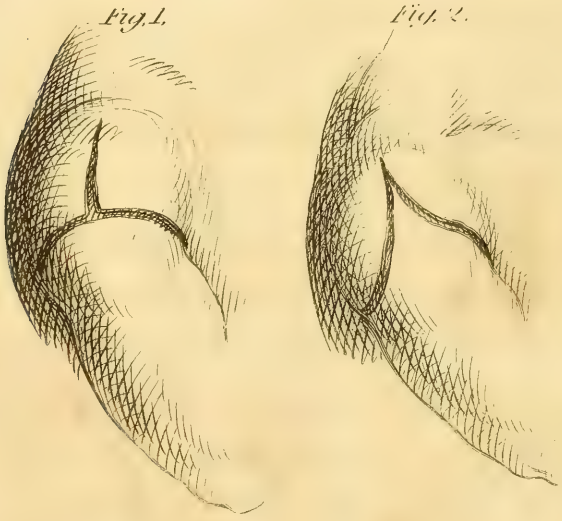
"The patient being laid on his back, with his shoulder over the edge of the table, make an incision through the membrana adiposa, from the shoulder across the pectoral muscle, down to the arm-pit; and in order to save as much skin as possible, begin it about two inches below the joint; then turning the knife with its edge upwards, divide that muscle, and part of the deltoid, all which may be done without danger of wounding the great vessels, which will become exposed by these openings; if they be not, cut still more of the deltoid muscle, and carry the arm backward: then with a strong ligature, having tied the artery and vein, carefully divide those vessels at a considerable distance below the ligature, and pursue the circular incision through the joint, cutting first into that part of the bursal ligament which is nearest to the axilla: for if you attempt to make way into the joint, on the upper part of the shoulder, the projection of the processus acromion and processus coracoides, will very much embarrass, if not baffle the operation."

The next method to be mentioned, is that of Bromfield. He, I believe, was too partial to the operation.

He

He drew an incision from the point at which the pectoral muscle is inserted, to the opposite point in the back of the arm, and a second incision from the point of the acromion to meet it.

Then he dissects back the inner flap, until he lays open the vessels. He then ties the artery and the vein also; and, finally, he turns out the head of the bone, and cuts across the remaining portion of the skin on the lower part.



Thus, then, stands Bromfield's operation (fig. 1.). But the best method will, I conceive, be the following (fig. 2.).

1. The patient is supported on a chair: an assistant stands behind him, and with some such instrument as a boot-hook, on the iron of which there is bound a firm compress, he presses down upon the subclavian

subclavian artery, as it passes over the first rib. On this compression, however, the surgeon must not entirely rely; but taking what assistance he can obtain, he resolves at the same time to be independent of it.

2. Another assistant stands before the patient; he pushes his fingers into the axilla, and grasps betwixt his finger and thumb the cord of the nerves and artery. This is not to compress the artery for the purpose of stemming the blood, but to facilitate an after part of the operation.

3. The surgeon, with his operating assistant, stands by the side of the assistant. His only instrument is a large scalpel of the common form.

The first incision is carried from the point of the acromion process, in a semicircular direction (convexly forward), to near the assistant's fingers, who holds the artery in the axilla. Now the larger muscular arteries must be tied.

4. The second incision is a counterpart to the first, and is made in a semicircular direction, terminating by cutting through the tendon of the pectoral muscle, where the large branches are to be secured.

5. Now the surgeon cuts into the capsule, and cuts the long tendon of the biceps, when the assistant pushes out the head of the arm-bone from the socket.

6. He now carries his knife close by the lower side of the arm-bone; and then the assistant, who held the axillary artery betwixt his finger and thumb, thrusts it up, and presents it to him conveniently to be taken up with the needle, having first

slightly detached it from the neighbouring nerves; and, lastly, cutting across the remaining skin, the operation is finished.

It has happened that the nerves have hung from the wound, or, by forming adhesion to the cicatrix, have produced great distress. The nerves are therefore to be cut as high as possible, and thrust deep into the wound.

There is no occasion to cut or scarify the cartilage of the glenoid cavity; the flaps heal over it.

After what has been said of adhesive straps, and compress, there need be no further description. I am confident that it would be more easy to lay the flaps nicely together; to unite them by long adhesive straps; to apply soft compresses; to lay them in contact; and to secure the whole by the roller round the body and shoulder, in the form of the spica bandage—than to describe all this with precision.

GENERAL CONCLUDING REMARKS.

Hæmorrhagy, after amputation, may be the effect of insecure tying of the principal artery; and then it will be very terrible indeed. The surgeon will sometimes be conscious that from the faintness of the patient during the operation, he has been obliged to dress the stump without securing all the arteries of the second class. He has, perhaps, got only one or two secured, when in general amputation at the same part requires five or six branches to be secured.

cured. With the reviving strength, the arteries bleed, and the dressings have to be taken off, and the face of the stump has again to be laid open!

It may happen that the integuments do not adhere to the face of the stump, the flesh hangs loose, and the arteries, from want of due inflammatory action, are insecure. Or it may happen that the stump opening, and becoming deeply ulcerated, the arteries are opened, and bleed profusely. Bleeding from this cause may even happen in the third week. (See the Introduction.)

The history of the operation, shows us that the effect of the single incision in which the knife was carried down to the bone at once, was the pyramidal stump. Ravaton said that few escaped by that operation without the bone projecting. There were generally three or four exfoliations; and often the surgeon had to cut off the bone at the distance of some months. To the student the excellence of the London hospital is, that there is much good and not a little bad surgery; and in the season he will seldom miss the opportunity of seeing a variety of bad stumps.

When the bone is left long, and is not completely buried in the flesh, the muscles and the integuments will shrink further from the bone. It is left bare and unsupported, and dies. It exfoliates; but even after exfoliations, it is sharp, and perhaps projecting, and in the end forms the apex of a tender conical stump, which is liable on many occasions to have the cicatrix break out in ulcerations; and it is quite unfit to bear upon a wooden leg.

When by necessity or accident the modern surgeon leaves too little skin, well aware of the consequence—an open sore and tedious cure, and a sugar-loaf stump—he becomes perhaps too anxious to correct the deficiency; and drawing the integuments strongly over the face of the stumps by stitches, or other violent means, he only produces irritation, inflammation, and a further retraction than perhaps otherwise might happen.

I am inclined to think that in general practice the patients are too long kept in bed. As soon as the arteries are secured, and the ligatures come away, the patient ought to be raised from bed, and if convenience offers, carried into well-ventilated and fresh apartments.

In crowded hospitals, fever, infectious erysipelas, or gangrene, are to be dreaded. Then we soon find the parts separate, and fall loose; the integuments, wasted and thin, hang like a pouch over the bone, which projects, black and dead. Now our only hope is more generous diet, change of air, wine and bark, by which the patient may be revived, the bone thrown off, and the soft parts fall into a better suppuration. But here the effect of all our precautions during the operation is lost; for if the patient survive the suppuration, the stump is conical, weak, and unable to suffer pressure. In this way a conical stump may be sent out from the hands of the most dexterous surgeon.

CHAPTER

CHAPTER X.

OF WOUNDS OF THE HEAD, AND OF TREPAN.

When I endeavour to fix my attention only upon those cases which I have seen, and the appearances which have presented themselves to me on dissection, and when I try altogether to divest myself of the impressions received from books, I make out the following short table of the causes of death from injuries of the head.

1. From concussion, in which the person has never recovered the shock, and has died of the debility produced by the universal disorder of the brain.

2. From the conjoined effect of concussion and extravasated blood.

3. From injury of the bone, without fracture, followed

lowed by suppuration of the membranes and of the brain.

4. From fracture and depression, produced by blows, where the substance of the brain in the neighbourhood of the depressed bone has been injured by the percussion of the bone, the patient recovers from the effects of the concussion, but the brain has become ulcerated deeply.

5. From universal inflammation of the brain, in consequence of concussion.

6. From fungous tumour of the brain, sprouting through the openings of the skull, either from deficiency of the skull, the depressed portion being taken away, or from the trepan-hole.

7. From caries, in consequence of very old injuries of the bone at length ulcerating the dura mater, and affecting the brain.

Of each of these causes of death, I preserve specimens in my collection to illustrate the pathology of this subject of the skull.

In reasoning on the symptoms produced by injuries of the head, we should learn to distinguish betwixt the local and constitutional symptoms of disease of the bone and integuments, and those which are the effect of disease of the brain itself; and in the second place, remember that the affection of the brain itself, when it has once entered into diseased action, from an injury of the bone, is almost certainly fatal, and that if we wait for the symptoms of a beginning affection of the brain, we shall, in

ninety-nine of a hundred cases be too late to do good.

When I speak here of the diseased action of the brain, I do not mean the simple effect of concussion, or the general state of excitement and action of the vessels of the brain, nor yet of the influence of compression: these we may counteract. But I mean the derangement of the brain—the approach of local disease proceeding to the brain and membranes; and this, although we may prevent, we cannot controul, after it has made any considerable progress.

The good sense and discrimination of the surgeon, is therefore to be exercised in ascertaining what are the symptoms of concussion; of compression; of the general state of inflammation of the brain; and of the partial inflammation of the brain, with ulcer, a large coagulum oppressing the brain.

Fissures, and slight depressions of the skull, are distinguished by no symptoms, unless in so far as the case resolves into some of the foregoing. For example, immediately after the accident they are attended with the symptoms of concussion, and afterwards, perhaps, with general or partial inflammation of the brain. But still these symptoms do not proceed from the fracture: they originate from the injury which the brain received, at the same time that the bone was hurt.

There is another class of symptoms marking that disease of the brain, which arises slowly, and in process of time, by communication from the carious or fractured bone; and here we have always to re-

member the remark of Mr. Hunter, that from a slight blow on the head, we find the membranes of the brain much oftener to suppurate than the tibia or fibula do from a similar blow on the shin. "These membranes of the brain appear to suppurate very readily, and with very little inflammation *."

OF CONCUSSION OF THE BRAIN.

Concussion is that disorder of the brain which is more or less the immediate consequence of every injury of the head, from falls or blows. It is the effect of the vibration and percussion affecting the matter of the brain directly, and without the intermedium of the circulation.

In a slighter degree it is marked by giddiness, dimness of sight, weakness of the limbs, trembling and nausea; and this every one has experienced. There is in this state more of disorder of sensation than of oblivion or dulness. There is less insensibility to pain than in oppression. When the brain suffers in a greater degree, the man becomes insensible; his face is pale, his skin cold, his limbs relaxed, his breathing low and weak, the pulse feeble, and the pupil dilated, but not so remarkably as in compression. As the effects of violent concussion wear off, the sensibility gradually returns, the pupil

* On the Blood, 235.

contracts

contracts, the pulse rises, the skin gets warm: the patient can be roused from his lethargy as from sleep, or sensibility returns at intervals; he awakes, answers questions, and again relapses. Reviving, there is confusion of intellect, delirium, sometimes loss of memory; the function of the stomach is deranged, and through the stomach, the hepatic system also.

In concussion there is an injury of the matter of the brain, as well as loss of sensation. In oppression, the injury is less general: it does not confound the simple effect of the insensibility, nor rouse the vascular action.

With the function of the nervous system, the powers of the circulating vessels also return; and now they correspond with the disturbance of the matter of the brain, and the vessels of the brain run into the extreme of over action.

If the patient, recovered in a degree, again falls low, with the symptoms of oppression from vascular action, the face is full, the features more in action, the pulse full, and risen to 120 or 140, and the breathing stertorous. Or again, as the insensibility is removed, the high excitement of the brain succeeds; the pulse becomes stronger, the eye sensible to light, and the iris moveable; there succeeds a contracted pupil, and intolerance of light, a flushing of the countenance, a wild look and incoherence, an impatience and restlessness; then high delirium, and this changing into the low delirium of oppression, which yields only to insensibility and death.—As this stage advances, as the pulse rises and is full,

the eyes become vivid or inflamed, and the cheek, from the paleness of the first effect, becomes flushed. We must now bleed largely and repeatedly, apply leeches to the temples, blister the head, purge, and afterwards keep the bowels open; and it were well, I think, if a nausea were kept up by small doses of tartarised antimony. But I beg leave further to remark, that when this treatment overcomes the vascular action, the patient will be apt to fall into extreme feebleness.

We see, from this view of the accession of symptoms, why evacuations are not required immediately upon receiving the injury—for then there is a fear of death from the immediate injury; why they should not be great in the first stage, and more profuse when the pulse rises. Often, however, the pulse does not rise to this violence of inflammatory action. An oppression, like to that described as the effect of pressure on the brain, immediately succeeds to the debility produced in the first instance, with apoplectic character, and stertorous breathing, total insensibility to light, involuntary passing of the urine and fæces, and finally death. If the pain, vertigo, confusion of sight, and nausea, which immediately follow a blow on the head, are removed, and if, after some days, there is a return of complaints, with rigor, restlessness, and fever, it is a disease entirely different from the first nervous affection.—Having no direct relation to concussion, it proceeds probably from some local affection of the skull or brain. In the universal inflammation of the brain, which is occasioned by concussion, there is no snch interval

interval (as far as I have had experience) betwixt the first purely nervous effect and the rising of the inflammatory symptoms.

I dissected the brain of a man who had been imagined to lie ill of nervous fever, and in whom the inflammatory stage had followed the concussion, without the insensibility being much alleviated. The whole brain was inflamed, and very vascular, particularly one hemisphere; and on the surface there were large flakes of opaque coagulable lymph thrown out. There was fracture and depression of the temporal bone, which put the nature of the injury out of doubt; but near that depression the surface of the brain was as natural as any part of the whole, while the greater degree of inflammation was removed from opposite the fracture, and was chiefly where the brain is in contact with the falx. There was little if any fluid extravasation, and there were exhibited the marks of the greatest degree of active inflammation which I have ever seen in the brain. Though the skull was fractured, yet as the inflammation was not great in the neighbourhood of the fractured bone, and as there was no adhesion, nor tendency to ulceration, in the brain or dura mater, near the injured bone, I construed this into the pure case of inflammation from concussion. When a patient is recovering from the effects of concussion, the mind is for a long time very irregularly exerted; there is confusion of ideas, and partial loss of memory. Sometimes he remains long silly; or his speech is affected, or his limbs are feeble and almost paralytic.

OF INFLAMMATION OF THE BRAIN.

I CANNOT allow myself to make a distinction betwixt the inflammation of the brain and the pia mater. This membrane is not only the immediately investing membrane, but it passes down into the substance of the brain, and is the vehicle of the vessels. These vessels are the agents, and may be said to be the seat of the inflammation in all cases. But the symptoms of inflammation will be very different, as they are the consequence of a general injury to the brain, or as they follow the progress of inflammation from the bone and dura mater to the surface of the brain.

If a man be lying stunned, and inflammation accedes before the return of sensibility, the pupils of the eyes become more contracted, the pulse harder and quick, the tongue dry; he withdraws his hand from the surgeon; his features have an unpleasant frown, and the cheek is fuller and red.

If we now wait for the return of the senses, before we use evacuants, we may be terribly deceived by the powers of the system rapidly failing under the pressure of this additional injury to the brain.

If the senses be awake, and the inflammation then accedes, it will be marked by the fever, and intense pain of the head; by a flushed countenance, inflamed eye,

eye, intolerance of light, tinnitus aurum, and watchfulness. Then when the paroxysm still rises, there is fierceness of the countenance, delirium, and violent struggles.

There must be here a vigorous plan of treatment pursued, or the texture of the brain may suffer permanently, or the patient sink irrecoverably into the oppression from over action and effusion. We must bleed largely and repeatedly; brisk purges must be given, and repeated, with antimonials; and when the stroke of the pulsation of the carotid and temporal arteries are somewhat subdued, there may be blisters largely applied to the head and neck.

OF COMPRESSION OF THE BRAIN.

I SPEAK now of compression of the brain; because I wish to remove the confusion which results from the complication of symptoms of compression, concussion, and inflammation.

It seems very likely that many of our best surgical writers of the last age formed their opinions respecting the cause of symptoms only from what they saw during operation, and not as the result of investigation by dissection. They could not else have confounded the effect of matter and serum lodging on the brain, with that of depression of the bone, or effusion of blood. From what I have seen in dissection, I am convinced that they have attributed

to

to the matter lying on the surface of the dura mater, that which was more correctly to be assigned to the effect of deep disease and suppuration of the substance of the brain.

As to the question, whether the symptoms of oppression can proceed merely from the degree of compression caused by a little purulent matter? I can only say, that I have seen a much greater degree of compression occasioned by a depressed bone, or a coagulum of blood, without producing the same effect. This makes me suppose that the comatose affection in those cases of ulceration, is the consequence of the inflammatory action which accompanied the purulent discharge, or the ulceration, not of the compression from the pus merely.

The conclusion which we ought to draw from this evident error is, that wherever the function of the brain, and its due influence on the other functions of the body, are morbidly diminished, Oppression is the only term which can properly be made use of as descriptive of it; as with the failure of the sensibility there is a torpor, and want of activity, which creeps over every faculty of mind and body *. Op-

* To me it appears that it is not the blood, or matter, or fluid, in the cavities, or in the surface of the brain, which is so apt to be attended with the symptoms of oppression, as when the fluid is in the substance of the brain. This may be illustrated by the effect of fluid in the thorax, and in the cellular membrane of the lungs. The one is long tolerable, the other quickly suffocates.

pression

pression relates to symptoms—compression is a cause.

But to speak more particularly of COMPRESSION OF THE BRAIN, these are the symptoms, so far as I have been enabled to observe—

1st. Pain of the head, giddiness, and dimness of sight, nausea and sickness, a slow labouring pulse, lowness, and increasing insensibility.

2d stage, Stupefaction, or partial paralysis; loss of voluntary motion; apoplectic stertor in the breathing; involuntary evacuations.

But we must not forget, that all of these symptoms will sometimes accompany other states of the brain, besides compression from the coagulum or the depressed bone.

The purest case of compression with which I am acquainted, is that related in the second volume of "The Anatomy of the Human Body," page 300. It proceeded from rupture of the middle artery of the cerebrum.

In apoplexy we cannot say that the symptoms proceed from compression, when we find it so frequently otherwise on dissection; nor, in the case of depression of the bone, can we say that the insensibility proceeds from the compression, purely, because there is at the same time concussion and injury of the brain; nor from coagulum betwixt the dura mater and bone, because this also has been the consequence of a shock which must affect the functions

functions of the brain, as well as fracture the skull. But still, in all these cases, the symptoms may be complicated with those of compression.

PATHOLOGICAL PRINCIPLE, EXPLAINING THE SYMPTOMS OF COMPRESSION.

Pure compression, as from effused blood, does not act on the matter of the brain, which is incompressible, but on the blood within the cranium. It acts by diminishing the capacity of the vessels of the brain, and consequently by diminishing in a greater or less degree the supply of blood to the brain. Following a diminution of blood, there must be a diminution of sensibility; for the function of the brain, and all depending on its influence, exists only by the continued influence of the blood. Then, with the torpor of the intellectual powers, comes insensibility of the body, and a diminished or total extinction of power in the voluntary muscles.

If the bone be depressed, it will be apt to act more partially; and if pushed deep upon the brain, it will act as a sharp irritating body, or show the effect of partial compression by a paralytic affection, whilst the general consequence of diminution of the capacity of the cranium accompanies this paralysis. But it requires a much greater degree of depression of the skull than is generally imagined, to produce the more universal compression of the brain.

However

However produced, the symptoms of compression are not sudden. There is as it were a gradual extinction. There is an increasing oppression of the senses, from which for a time the patient can be roused; an insensibility steals upon the body; the heart is loaded with blood, and it also has a degree of insensibility to its stimulus, which produces the very reverse of inflammation. It is languid, and slow in its action; and as it operates on a full ventricle, the pulse is full, but soft; there is no quickness or jar in the stroke. The respiration has always a consent with the state of the circulation; it is deep and labouring; partaking of the loss of action in the voluntary muscles, the larynx, pharynx, and velum are relaxed; they hang loose, on the inhaled air, and produce the stertorous breathing.

INJURIES OF THE SCALP, BONE, AND DURA MATER.

This is not the place for explaining the connections of the integuments, pericranium, bone, and dura mater. We have now only to observe the effects of their relations in injury and disease.

A contusion of the scalp, as explained in the introduction, has a ring of inflammation, with a soft centre, and may be mistaken for a depression of the skull. This requires only to be pointed out.

If a man has his scalp cut from the skull, but still with

with a broad adhesion to the rest of the integuments, and if it be alive and bleeding, it is to be replaced, and preserved in its place by adhesive straps, and by a soft compress and roller.

If we foresee much occasion of trouble with the hairy scalp, as preventing the adhesion of straps, some one point of the scalp may be fixed with a ligature; but this ligature should be taken early away. In general, we say, stitches are unnecessary, when the parts can be laid down upon a bone *.

If the integuments of the head are torn and bruised, and the dirt be kneaded into them, as by the passing of a cart-wheel upon the side of the head —then, as the parts must suppurate before they unite with the bone, a large poultice should be applied, and suppuration assisted. When the parts are clean and granulating, lay them down as recent parts.

But this advice is by no means absolute. If the dirt can be washed away, and the skin be not much

* There is undoubtedly some peculiarity in the scalp, which makes the injuries of it troublesome or dangerous, more than what is derived from the direct communication of disease to the brain. I attribute this to the sensibility of the hairy scalp; to its being spread over the bone, and being more liable to be bruised than any other part; and to the numerous connection of its nerves with those which go down to the viscera. Indeed, with every important nerve has the lesser sympathetic, or portia dura, and the branches of the fifth nerve connection.

bruised,

bruised, the parts may be made to adhere, at least partially, so as to diminish the extent of the wound. But what I particularly wish to guard against, is suppuration lying concealed under the scalp; for when the integuments are injured, as I have described, there is danger of their adhering only at the edges, while matter may be lodged under the loose scalp. At all times when the scalp is laid down for adhesion, the surgeon must continually watch its progress, and be careful to ascertain by the touch, and the degree of tenderness, by the quaggy soft feel, and the blush of inflammation among the hair, whether suppuration be not taking place instead of adhesion.

If matter be allowed to form, it may fall down with rapid progress by the side of the ear. The integuments must now be punctured at a depending part, and the state of the bone ascertained by the probe. If the bone be not bare and rough, the matter must be squeezed out, and compresses brought gradually to encroach upon the margin of the abscess, so as to procure adhesion. But if the surface of the bone has been injured, and is now exfoliating, the scalp must be freely cut up.

If the outer table be cut off from the skull, and be adhering to the scalp, I think it should be cut away, and the flap laid down on the diploe. †

When the corner of a stone has struck the head, and bruised or cut the integuments, and bruised the bone, it is a very bad wound; one in which the danger is to be dreaded, whilst yet we cannot act

 decidedly

† This is incorrect very bad practice

decidedly to prevent it*. If we find that the pericranium separates from the injured bone, and that the bone remains smooth, and of a dead white, or of the yellowness of ivory, we have to dread that the life of the bone, in its entire depth, is destroyed: or the centre or diploe of the bone may have inflamed, and the outer table (in as much as regards the life of the bone) be separated from the part beneath; though it still retains its adhesion by the earthy part of the bone, just as a slough continues unseparated for a long time after its death.

A question in this case occurs, whether, when you have determined on the application of the trephine, the outer table only is to be taken away, and the matter within the bone allowed to escape, or the perforation is to be completed so as to expose the dura mater?

If the taking away of the outer table alone, can ever be deemed sufficient, it must be only where we have been able to anticipate the evil. For when matter is actually confined in the centre of the bone, and the outer table is dead or carious, the inner table, and consequently the dura mater, cannot be safe. If the saw give out a fetid smell, or if matter ooze out by the side of the instrument, it is safe to

* This is that kind of injury which is very apt to be attended with fracture of the internal table, although the outer surface be only bruised.

From such an injury, after years, an internal sharp exostosis has arisen.

take

take that as a hint to persevere; and I am not in such a case satisfied with breaking up the outer table.

If shivering and sickness have ushered in the train of symptoms, the view is no longer to be confined to the bone; the brain itself is directly in danger.

Both the physician and surgeon should be aware of the slow progress and gradual effect of the caries of the skull after contusion. When the bone has been injured, but not deadened, it falls slowly into disease; it becomes carious and spongy, and admits the oozing out of matter. The dura mater does not separate from the bone, as in the more common case of death of the bone from injury; but being the internal periosteum of the bone, it partakes of its disease, and grows into its carious cells. This is a disease of the skull, like to the common disease of bones, where the external and internal periosteum, and substance of the bone, is diseased, with decay of internal parts, and the formation of exostosis.

But here the brain is still the source of apprehension and danger: and if the disease be neglected, sooner or later the surface of the brain will become diseased, and abscess form in its substance. When the disease is in an early stage, the exfoliation of the bone, or the cutting of it out by operation, may save the patient; but should the granulations of the dura mater have sprouted into the interstices of the bone, our endeavour to extract the diseased portion will endanger the tearing up of the dura mater, and

by violence produce a fatal accession of inflammation.

There is an injury of the skull which produces the PUFFY TUMOUR OF THE SCALP, and which is the most frequent occurrence of any. It is pregnant with the most imminent danger. It occurs when the scalp has suffered by the blow, and yet there is no cut. Some days after a scuffle, the patient begins to feel pain in the part where he supposed that he had received a very trifling injury. The part is acutely pained on pressure, and there is a soreness over the whole head. Upon the place where the bone was injured, there is a puffy diffused swelling. By and by the patient becomes languid, and inattentive to questions; rigors succeed; his strength fails, and the pulse becomes quick; the sleep disturbed. Or, after lying insensible for some time after the injury, he recovers, and remains for a day or two quite sensible; but there is a sickness and indescribable languor: then follow frequent fits of shivering, succeeded by heat, and great restlessness, confusion of the mind, and head-ach; his countenance is bad, the skin is pale,an d the limbs weak and trembling.

When the bone is laid bare by incisions, the pericranium is found to be separated from the bone. The bone dries quickly on exposure; for the surface is dead. Probably both tables of the bone have suffered; in which case the dura mater will have separated from the inside of the bone.

If this state of the bone has succeeded to an open wound, the integuments are pale, gleety, and loose,

loose, and the edges of them have separated from the bone *.

In the first attack of this disease, we should bleed largely and repeatedly; but when the disease of the bone has commenced—or rather, we should say, when the bone is dead—what can we expect from purging and bleeding? A large trephine is then to be put on, and the diseased portion taken entirely away. This frees the matter on the dura mater from confinement, takes away the source of irritation, and allows of granulation.

But I again repeat, that so great is the tendency of the brain to suppurate, that if the dura mater is much diseased, we may suspect, nay be almost certain, that the pia mater has adhered to it, and that the surface of the brain has suppurated. What should be done in this case, I cannot decide. The general opinion is that the dura mater should be punctured. The case is a desperate one.

INJURY OF THE BONE FROM A GUN-SHOT WOUND.

If the ball strikes the head obliquely, the injury will in all probability resolve into the case of contusio cranii. Though the bone be not fractured, it is bruised and killed. We know the consequence;

* See Pott, who has accurately described this consequence of contusion.

and,

and, certain from the beginning, that the ball has injured the cranium, &c. if it has touched it, we are prompt in freeing the dura mater of the bone, on the very first accession of symptoms.

When the skull is broken by balls, or the fragments of bombs, we are told (for this I have not seen) that the dura mater is often covered with blood, which firmly adheres; and sometimes spots of extravasated blood are seen upon its surface, resembling the beginning of gangrene. If the dura mater has been torn up by the fracture, or is pricked by the bone, or has suffered by the attrition of the ball, it is to be largely laid open, says Duff. This is certainly necessary only in the case of contusion of the membrane.

OF EXFOLIATION OF THE CRANIUM.

The last observation which I conceive it necessary to make on the injury of the bone, relates to exfoliation. This process is very frequently the consequence of contusion of the integuments, or abrasion of the pericranium. The outer table is dead, and deprived of vascularity; it becomes a source of irritation to the meditullium, and inner table which still preserve their vitality. This is the commencement of the change. The inner table inflames; and by the absorption of the earth of bone within the influence of its vessels, granulations shoot into the space left by the absorbed bone, and seem to push off the scale of exfoliation. But in fact the granulations, by growing

growing into the irregular surface of the exfoliating table, often retain it for some time.

In young people, this process is more easily and quickly performed than in old. I have seen from the skull of a young infant exfoliations of the size and thickness of wafers, proceeding, as I conceived, from injury by the forceps. In old people, this change is very slowly produced; and very often the firmness and density of the earthy part of the bone keeps the exfoliating portion long attached a source of irritation to the bone beneath, until the dura mater ulcerates.

Of this I have seen many examples, when a little longer time would have safely separated the surface of the bone, and have saved the person's life. In other instances, I have found that when there has been an ineffectual effort of the lower part of the bone to detach itself from the dead surface, and the formation of a shallow furrow, the mark of beginning exfoliation, the whole bone has yielded to the ineffectual effort, and become dead; then the dura mater having separated from the bone, and white matter having been formed on the surface of the dura mater, an ulcer in the brain has cut the person off.

It becomes then a question of some importance to determine whether interference may assist this process. We ought, I conceive, to keep the vascular action low; for exfoliation is naturally a slow process, and the danger is, that the irritation of the dead portion of bone may be too much for the part beneath. To allow the little sprouts of granulation

to

to rise by the sides of the bone, or through the exfoliating bone, must surely be of advantage; and therefore I conceive that small holes may be made with the perforator. These granulations, I conceive, give relief to the action of the lower portion of the bone. But when the bone is loose, and yields to pressure, we must take care how we apply instruments which may bruise and irritate the now soft parts beneath.

OF EXTRAVASATION OF BLOOD BETWIXT THE BONE AND DURA MATER.

There is certainly something obscure and difficult to be understood in the phenomenon of blood being found lying betwixt the bone and dura mater.

I find a man who has fallen from a great height lying comatose, with a very feeble pulse. He is trepaned, and a coagulum of blood is found under the skull, an inch in depth. The coagulum is cleaned away; the man considerably revives; but there is no new flow of blood. Surely it could not be that an artery had been torn, and that this artery had bled with such impetuosity that it tore up the adhesions of the dura mater to the bone? Would not an artery that had force to tear up the dura mater bleed still when the coagulum was taken away by operation?

The

The truth, I fancy, is, that by the shock the dura mater is shaken from the bone, and that in consequence of this the blood is poured out by innumerable small vessels, which soon cease to bleed; and not from large vessels which, were we even to allow that they throw out this coagulum, are not able to tear up the adhesions; which indeed I with difficulty sometimes can do with my hands. This explanation is the suggestion of my brother, arising first in his mind, if I recollect from the circumstances of a case in which I was operating.

The shock which thus explains to us the extravasation, will also occasion the symptoms to be complicated with the effect of concussion, or a shock on the brain. I have never seen oppression purely characterized, when it proceeded from mere external injury. But I have seen cases where there was reason to suppose that the breathing was more sonorous, and performed with greater difficulty and heaving, and a more languid pulsation of the artery, in consequence of this oppression, from extravasation combined with the effect of concussion.

I doubt very much if we ought to use the trepan for the evacuation of supposed coagula. Slighter effusions may be absorbed; and if the blood is exposed, the dura mater will be more likely to suppurate. If, however, the bones be at the same time broken, and the coagulum exposed, we should endeavour to take it entirely away, to allow the dura mater to rise.

OF THE MORE PARTIAL INFLAMMATION OF THE BRAIN, WITH ULCER.

When the skull is fractured by a smart blow, the effect is different from that of a fall, or from the injury produced by a heavy block falling on the head. There is more of local injury, with less general concussion. I have in such a case perceived the part of the brain beneath the fractured bone, without any wound of the dura mater, to be injured by the sharp percussion, and the beating in of the skull. In this case the injured part falls into inflammation, exhibiting on dissection many spots of extravasated blood, and in the centre an ulcer and abscess. In general, although the ulcer has not penetrated to the ventricles, the whole surface of the lateral ventricle of the side diseased will be found bedewed with coagulable lymph and pus. With this deep disease of the brain, there is very little mark of general inflammation in its substance.

Under this complaint the patient continues long rational, with only an obtuse pain in his head. But he is pale and feeble, and has tremors. When he puts out his tongue, it trembles like that of one in fever; it is foul; and there is sickness and vomiting. He has rigors from time to time; indulges in bed; is with difficulty roused; insensibility encroaches

upon his faculties, and he makes only confused attempts to speak, like one in a dream. The opposite side of the body lies still, whilst he moves the leg and hand of the same side more freely. Lingering thus, with a weak, fluttering pulse, he dies.

OF THE FUNGUS CEREBRI.

I HAVE dissected only two cases of that tumour called Fungus Cerebri, which rises from the perforation of the skull and dura mater. But the observations which I have made, and the opinion I have formed, are so different from those of my learned friend Mr. Abernethy, that I think myself called upon in some degree to extend the consideration of the subject.

Mr. Abernethy conceives that such tumours proceed from an injury of part of the brain, which has terminated in a diseased state of the blood-vessels, similar to what appears in apoplexy; and that the morbid state increasing, one or more vessels give way, and an effusion of blood into the substance of the brain ensues. He supposes, that if in this state of the brain there were no opening in the cranium, apoplexy would be the consequence; but that the deficiency of the bone allows the blood to expand and press the brain and its meninges through the vacant space of the bone; that the dura mater soon ulcerates;

ulcerates; and that the tumour pushing through the opening, now increases with a rapidity proportionate to that with which the hæmorrhagy takes place within.

I have dissected a case very much resembling that described by Mr. Abernethy, in which the section of the brain around the root of the tumour shewed many spots of extravasation; and it would readily occur to any one, that this tumour had been occasioned by one of the larger vessels giving way, and pouring out a coagulum. But these spots of extravasated blood attend most ulcerations in the substance of the brain.

In the first place, I conceive that the deficiency of the skull, and the ulceration of the dura mater, always precede this disease; that it is in consequence of large openings in the skull by the trepan, or the lifting of large depressed pieces (accompanied by a tendency to ulceration in the substance of the brain), that the pulsation of the brain forces the dura mater against the sharp edge of the bone, when it ulcerates; and then there quickly sprouts up this fungous tumour from the substance of the brain.

Mr. Abernethy conceives that the bursting of the vessel within the brain is a consequence of the blow; but I have seen the disease arise after a venereal caries of the skull, in which the whole thickness of the bone had, after a great length of time, exfoliated.

Further, the surface of this tumour bleeds when torn or cut. Not only it bleeds if it be torn off, but

but the abraded surface bleeds. This is not like a coagulum. 2. It shrinks and collapses upon death; which is certainly a mark of a part having circulation within it. 3. I have a preparation of this disease, where an ulcer passes from its base into the lateral ventricle, and where the ulcer communicated outwardly, and yet no drop of blood or coagulum was seen upon the surface of the brain, or in the cavities. 4. It is not formed of concentric lamina, as the coagulum of an aneurism is. The blood never bursts from its surface, as it would do even from a venous tumour, which had power in the first instance to burst the membranes of the brain. It is affected like spongy granulation by caustic. A degree of compression, equal to the compression of a considerable artery, will not subdue it when its growth has got head. 5. It has a fibrous structure; and when it is dissolved in death, it hangs in shreds not like a coagulum. Lastly, in the engraving which I have given, it will be seen, that the peculiar disposition to this disease is not shown merely in the tumour, but is evident on the margin, and inner-side of the ulcerated cavity.

It is for these reasons that I venture to differ in opinion with Mr. Abernethy, for whose accuracy of observation and abilities I have great respect, heightened by friendship, and a sense of the great improvement I have reaped from his conversation, and from his works.

But further, when I was writing upon this subject,

ject, with Mr. Abernethy's book, and my preparations of the fungus cerebri before me, he paid me a visit; and his conclusion from our difference was, that we had seen different specimens of tumour issuing from the brain.

This conclusion was very agreeable to me, and gives me confidence in stating to my readers the short description of what I have seen, and at the same time to inform them, that there are other distinctions in the nature of this tumour to be observed, which, though I have not seen, they were to attend to.

There are three kinds of tumours which may arise in consequence of part of the skull being taken away.

1. A fungous excrescence from the dura mater.

2. Mr. Abernethy describes "a state of protrusion, which has been described by others as prodigious, on account of its rapid growth, &c. This he affirms, in three instances, to be owing to effusion of blood, which was a hama sarcoides."

This I have not seen.

3. The last is the proper fungus cerebri.

When a large portion of the cranium has been taken away, either by caries or the trepan, or when the trephine has been used, and the dura mater hurt by the teeth of the saw; or, lastly, when the edge of the skull has been left sharp and ragged—then, by the pulsation of the brain, which forces the dura mater upon the edges of the opening, that membrane is in part cut, in part ulcerated.

ated. At this place the support which is natural to the brain is taken away, and the diseased part of the brain, and the ulcer which was forming, sends out a loose fungus; and, perhaps, in some instances, part of the brain itself is in the first instance protruded. Whilst the tumour rises outwardly, there is proceeding at the same time an ulceration in the surface of the brain; and from this diseased portion of the brain, there rises, in consequence of the want of the natural degree of compression, a luxuriant fungus; or the soft surface of the brain yielding, it bursts, perhaps in consequence of violent coughing, and from it this tumour arises.

Very soon after the separation of the bone, and the ulceration of the dura mater, the protrusion begins *. In the commencement, and daily during the continuance of sensibility, the patient complains of a cold shivering, and pain in the head; his countenance is of a pale, dirty, cadaverous yellow. As the tumour increases, he has frequent sickness, is giddy, and reels like a drunken man; the pulse becomes slow and weak; he betakes himself entirely to bed; can no longer sit up; becomes incoherent; he lies oppressed, and his pulse is a mere tremulous motion of the artery. The disease runs its course in about eight days.

These are the symptoms, as I have observed them, when originating in exfoliation from the venereal

* My case-book says, on the second day after the separation of an exfoliation.

disease,

disease, and where consequently it is natural to suppose that there was no previous injury of the brain, as there may be in the case of fracture.

I conceive this fungus of the brain to be attended with the utmost danger; that the tumour should be cut freely off; and if it bleeds, so much the better; and that after this there should be slight and equable pressure. I conceive also that the pressure and growth of the fungus keeps up high vascular action in all that part of the brain to which it is attached; that as in other instances the cutting off of an excrescence from a tumour checks the activity of vessels, so here it will also allow the matter commonly formed behind to escape. When nature performs a cure, it is by the fungus being choaked, and dropping off, either in consequence of its own rapid increase, or in consequence of the growth of the granulations of the scalp and bones.

CHAPTER

CHAPTER XI.

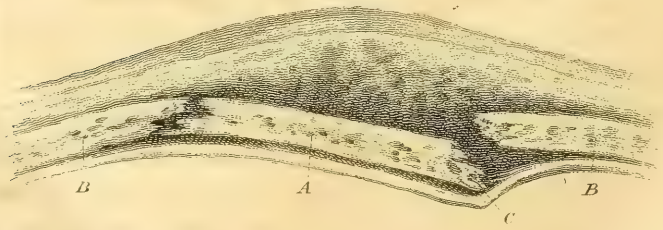
OF THE OPERATION OF TREPAN.

The trephine is applied, 1. To prevent the depressed and irregular bone from becoming a source of irritation to the membranes, and consequently to the brain itself; the effects of which we have already explained. 2. To remove the dead portions of the bone, when the dura mater has separated from it, and matter lies upon that membrane. 3. To evacuate blood effused betwixt the bone and dura mater. 4. To enable us to raise great depressions of the skull, which are oppressing the brain.

Let us never forget that cutting down the integuments, perforating the skull, and laying bare the dura mater, forms a very serious and dangerous wound, which is not to be risked, unless when a more pressing danger requires it. Simple as this injunction may appear, it seems to be often necessary.

When there is fracture and depression, without any urgent symptoms, the general rule is to trust to a natural process for relief. I must say, however, that by the concurring opinion of several eminent men, this rule may be carried too far, and this although I look upon the operation of trepan as a very serious injury.

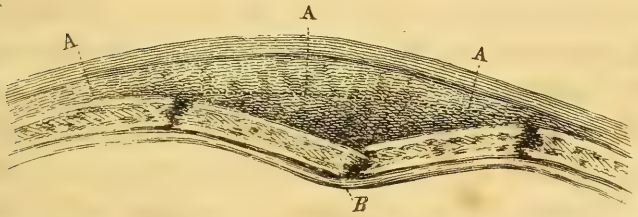
If it be said, that the danger of oppressing the brain should not induce the surgeon to operate, and that to perform trepan, in order to raise the bone which seems to threaten, or to cause oppression, is to act from a needless alarm—I should answer, that it is not upon the footing of this danger that I rest my opinion. I know that it takes a very deep depression to oppress the brain. But what I rely upon is this, that when I feel a rough edge of the skull, from which the corresponding part has violently been depressed, I must conclude that the edge which presses on the dura mater is from the brittleness of the inner table, rougher, and armed with more sharp spiculæ than that which I feel with my finger.



This

This sketch demonstrates the state of the part. A, the depressed bone. B B, the circle of the skull in its natural position. I affirm that there is great danger of the dura mater being irritated to suppuration or ulceration, from that point of bone at C; and I always endeavour to judge of the sharpness of the depressed edge, before I advise the use of the trephine.

In a fracture of this kind, I conceive that, *cæteris paribus*, there is much less chance of its irritating the membranes.



A A A, the natural circle of the cranium. B, the angle of depression, which, with a greater degree of depression than the last, does not present so sharp an edge to the dura mater, and consequently is not so dangerous.

And here I am naturally led to remark on the subject of bleeding in cases of trepan, that as in inflammations of the lungs our safety is in bleeding, so is it in this case. Bleeding acts in a two-fold

way; by subduing the inflammatory action of the circulating vessels; and at the same time directly, by subtracting a quantity of blood, giving a calmer motion to the blood in the brain, and subduing the impulse of the brain against the depressed bone, or the edges of the trepanned hole. So it is in inflammation of the lungs: by bleeding the inflammatory action is diminished, while the lessened velocity of the circulation and quantity of blood in the system, diminishes the call for respiration, and gives a quieter and more equable motion of the lungs. In all cases in which there is an irregular surface presented to the brain, I dread a strong, hard pulse, as necessarily perpetuating the injury of the membrane of the brain, by pulsation against the bone. In every case, therefore, except that state which immediately follows concussion of the brain, the circulation must be kept very low, and all tendency of the blood to the head prevented.

The different kinds of injury of the bone require no further definition than the names themselves imply. 1. Fracture. 2. Fracture, with depression. 3. Fissure. 4. Capillary fissure. 5. Contusion. I may only add, that fissure, being the rent of the bone, without the gaping of it, is more generally produced by falls, when the head hits broad upon the ground; and that fracture with great depression is more frequently the effect of sharp blows. Of course there are many exceptions to this arrangement.

For a very evident reason, when we have to follow a fissure, we cut upon that extremity which runs

runs towards the temple. If there is a fissuré in the temple, with bleeding from the ears, we may suspect that the rent has gone down into the base of the skull. If the fracture is on the lower part of the frontal bone, the orbitary plate of the frontal bone may be beat up; and I have known two instances where this had happened and been neglected. This marginal plate, taken from one of my preparations, will explain my meaning. A, the frontal bone. B, the frontal sinus. C, the outer table, forming part of the sinus, beat in. The effect has been, that the orbital plate has been beat up on the anterior lobe of the brain.

When a fracture passes the margin of the orbit, but especially if the margin is shattered, we should lay down the eye-brow, and feel the socket with the finger.

Although

Although we do not operate for a fissure, yet it is very often necessary to ascertain the existence of a capillary fissure. A fissure may, we are told, be confounded with a suture, or the mark of an artery on the surface of a bone. But in either of these cases, though there may be some inequality of surface, there is not the peculiar gritty roughness which the point of the instrument conveys to the feel, when it is drawn along a rent or fissure. Further, when the pericranium is taken off, and the surface of the bone rasped over the suture, these natural irregularities disappear; but when there is a fracture or fissure, it becomes more distinct and defined, when the bone is a little cut down.

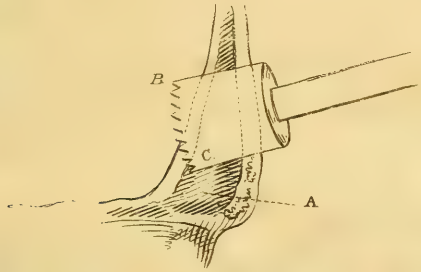
The blood sinks into a fissure, making a dark line; but it does not sink into the suture.

Without incision of the integuments, it is impossible to discover the place of fissures, especially the affection of the integuments over the injured bone is very deceiving, being common to every slight injury.

There is no part of the cranium exposed to injury from without, on which we may not apply the trephine, with those precautions which the knowledge of anatomy suggests.

Parts which I should rather avoid are, 1, The centre of the fore-head; for the ridge or internal spine of the frontal bone sometimes runs high, and if the crown of the trephine is set on here, we may pierce one half of the circle before the other, so as to injure the dura mater; and to avoid this, it requires the breaking up of the spine with considerable violence.

lence. 2. Over the frontal sinuses also, is an awkward place on which to perform trepan; for if we carry on the perforation on the same level that we first apply it, we shall certainly cut the inner table, which forms the back part of the sinus, entirely through on one side of the circle, before the other part of it is touched.



A, being the frontal sinus; B, will penetrate into the brain before C has touched the back part of the sinus.

I would advise, that in operating upon the sinuses, we should apply, first a large trephine, to perforate and break up the outer table, then a smaller one, which might be placed within this larger circle, perpendicularly upon the inner table.

In operating behind the ear, we must also have recourse to anatomy, and recollect the inequalities of the bone in the inside.

On the temporal process of the parietal bone, we must expect to hit upon the groove containing the great artery of the dura mater. We should avoid it,

it, therefore, if another place of the bone be found convenient for the elevation of the depression. We have now-a-days no dread of operating above the venous sinuses.

The INSTRUMENTS necessary are these—The common pocket case; a scalpel and probes; tenaculum; a quill; sponges; lint; trephines of two sizes—one to enable us to take out large portions of diseased bone, a smaller suited to a child's skull; perforator; brush; lenticular raspatory; trepan forceps; a pair of small forceps, like those used by Dr. Blake for the teeth; the saws of Mr. Hey; two or three elevators; and two with finer points than generally used, for picking out the loose pieces.

The trephine should have double teeth, so as to make the cut wide, by which we are better able to ascertain our progress during the operation. There ought to be a relation betwixt the point of the elevators and the impression made by the trephine. An elevator with a reverted point will be found useful, both in pricking out loose pieces, and in retaining a loose bone under the motions of the trephine.

INTEGUMENTS.

IN these days there is no scalping; that is to say, the surgeon does not cut out a circular piece of the scalp. He makes an incision upon the bone, and lays the flaps aside. Sometimes the way in which the

he integuments are cut by the accident will guide us how to make the incision; and we adapt our incision by making a triangular flap, or a semicircular cut, or raise and turn back the skin in the form of a T. But we ought to form the loose edge of our flap towards the ear, that matter may be the less liable to lodge, and that it may gravitate towards the edge of the integuments: we should manage to avoid acute angles, for they shrink.

In making these incisions, the knife should not be held with a perpendicular edge, but somewhat obliquely, by which we avoid all danger of cutting upon a large rent in the skull, and penetrating it.

Unless the patient be very weak, there will be no occasion to take up the artery. But at the same time, if we be cutting low upon the temple, the vessels may bleed too profusely, and require to be tied.

PERICRANIUM.

From what has been delivered, we ought to be careful of the pericranium, and not lay the bone naked to a greater extent than may be necessary for the application of the trephine; for we should then deprive the bone of its nourishing vessels.

When we are operating for large extravasations of blood below the skull, it has been observed that the surface of the bone does not bleed*. It is therefore particularly of importance in cases of ex-

* See Mr. Abernethy's Essays.

travasation,

travasation, where the dura mater, i. e. the internal periosteum, has been already separated, that we should as little as possible take away the pericranium, the external periosteum. The deficiency of blood, when we scrape off the membrane, ought to point out to us how we are endangering the loss of the entire supply of blood to the bone.

On the centre of that spot where we are to apply the trephine, the perforator is placed, and a hole made in which the centre pin of the trephine is to turn, that the circular saw may be kept steady. The few first motions of the trephine are to be made with a slight hand, and as soon as the circle cut in the bone is deep enough to preserve the trephine in its place, the centre pin must be taken out. When we have passed the outer table, the saw grates more softly, with less jarring; the sawings are bloody; and the instrument requires frequent brushing. We are entering upon the meditullium or diploe, viz. the more vascular centre of the bone. We must again have recourse to our anatomy here: recollect the thinness of a young skull, where the diploe is not yet formed; how frequently in old people again no distinction of tables is to be perceived; and the inequalities of the internal surface of the bone; in short, we must proceed as if we had no softer centre to expect. We have especially to recollect, tha the inner table is much thinner than the outer one.

If we are operating on a dry or dead bone, the sawings will be dry, and we have to observe if they get moist.

As

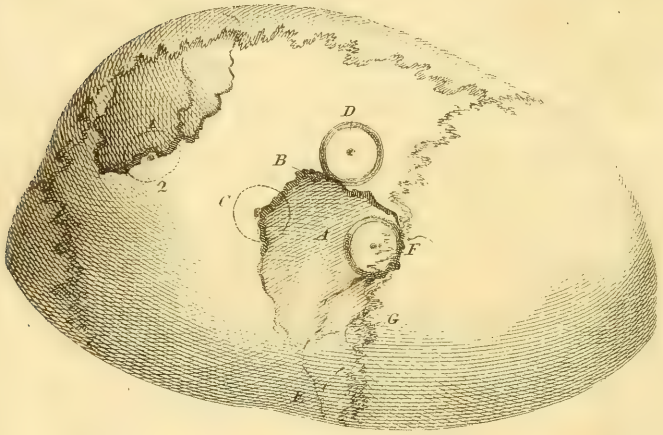
As the instrument may be supposed to approach the inner surface, it should be frequently withdrawn, and the point of a tooth-pick should be drawn round the circle in the bone, which sinking through any part that is entirely cut, gives us warning to incline the handle of the instrument so that the saw shall press only on the uncut part of the bone. Through the whole of the operation, the pressure should be light, to cut the bone easily; but now it should be very slight indeed, for the bone may suddenly give way. It will often happen, however, that we cannot cut the whole circle of the bone through, without injuring the dura mater in some point. It will therefore be necessary sometimes to break up the piece before we have perforated the bone through the whole circle, when the circular piece of bone is loose.

The form of the forceps teaches their use; or the two small levers which I have mentioned may be used. Having taken out the circular piece of bone, we introduce the elevator under the depressed bone; but probably we find it jammed and fixed, or, though loose, yet as we raise it on this side, the other side presses down upon the dura mater. If this cannot be prevented by the use of another lever *, the trepan must be again applied.

It is impossible to lay down in general rules where

* I have used a lever with the point of a hook-like form. It passes under the edge of the firm bone, and catches hold of the edge of the loose piece, so as to keep it steady.

we are to plant the trephine, in order successfully to elevate the bone. But I will venture so far against the common rule, as to say, that if we can we ought to place it upon the bone, which we are to take away, if it will bear the necessary pressure without injuring the dura mater. For if (as I conceive it is) the impulse of the dura mater against the edge of the bone is in proportion to the extent of the bone which is taken away, we ought to be careful that the trephine (as at present used of great size) be not applied on the sound bone, without necessity.



If A be a depressed piece of bone, quite below the level of the skull, it may happen that, owing to

the shattered part G, A is loose, and it may be raised simply by the lever introduced at B. But if this should not do, and the bone should be too firmly fixed for this simpler operation, then the trephine is to be applied. The common directions are such as would make us set it at D. But as by this means the whole space of the skull from E to D would be laid open, I would if possible apply it at F, upon that part of the bone which is to be taken away; and as the bone is firm and wedged here, I should do this with safety. I should expect that by taking out the circular portion F, I should be enabled to pick away the pieces, G, and thus open the fracture from F to E, and loosen the whole extent of the base of the depressed piece, by which it was held firm. But should this not be the case, then we might apply the trephine at D, on the sound bone.

But again, should A not be so far reduced below the level of the sound bone as to be free of the trephine (as indeed it seldom will be), should the edge of the depressed bone shelve under the firm bone, as it generally does, then we must keep free of its edge, or before the instrument has cut through we shall be pressing on the loose bone, and endangering the dura mater.

Suppose that the depressed bone is fixed as in (1), then we apply the perforator near the margin, and one half of the circular saw operates on the depressed portion, the other on the sound bone. The sound bone is loose before the other, in which case the object of the operation is accomplished; for by getting

getting out the portion (2), the elevator or lever may be introduced under the depressed portion.

If it shall appear that in the end it may be necessary to fix a trephine on the insulated portion of bone, it is better to do it at first; because after a circular portion is taken out on the margin of the depressed bone, it may have become loose, and will no longer bear the pressure of the instrument upon it, although, owing to its shelving edges, it is still impossible to elevate the bone.

Sometimes the portion of the inner table under the trephine (where we are operating on the sound outer table) may be loose, and we may be working it against the dura mater long before the instrument has passed through at any one point.

Fig. 1.

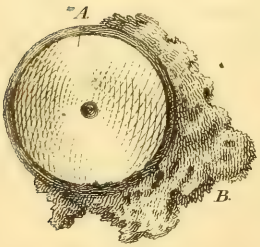
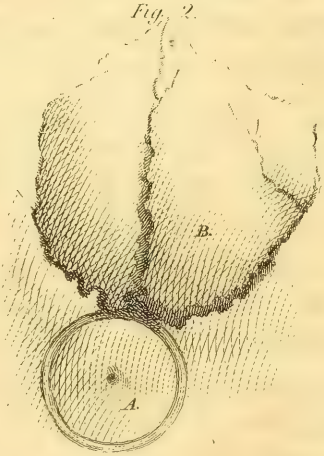


Fig. 2.



For example, the portion A, fig. 1, has been included in the trephine; but when the instrument had cut through the outer table, the inner table, B, being loose and splintered off from the firm part of the skull, yields to the pressure. Therefore, when we withdraw the saw occasionally, to clean it, we have to observe the degree of looseness of the circle included in it.

Again, supposing that we have to operate at A, fig. 2, in order to elevate B, although the circle seems to be on the firm bone, yet we have to recollect that almost always, the lower table being very brittle, the inner table of the depressed portion is of more extent than the apparent field of the depressed portion B; and consequently, when we have cut through the outer table of A, we begin to depress and jar on the extremity of B.

The great nicety of performing the operation of trepan, consists in observing well, in the first place, what point holds the bone firm; and whether the larger depressed piece may be brought through the opening of the skull, when we have perforated in this place or that.

The last advice I give relates to the use of the lever or elevators. Where there are lesser pieces which may be picked away, the operation of sawing may often, by raising these, be avoided; for the depressed piece may thus be entirely loosened, or we may then get the elevator so introduced as to raise the depressed bone. In my list of instruments, I have provided several of these elevators, and the meaning is, that they should be very seldom used singly;

singly; for unless the one side of the bone be held from sinking and being depressed, whilst the other is elevated, it will be pressed down so as to injure the parts beneath.

The lever may be used with advantage when the trephine is to be put on a piece of bone somewhat loose; for by that means the bone may be fixed and kept from jarring.

The dressings used for the wound after trepan, are of the simplest kind. Slips of lint, imbued with oil or soft ointment, are introduced under the flap, and on the dura mater, if it be much exposed. If the pulsation of the dura mater be very strong, and there be danger of its cutting on the sharp bone, small sindons of the same soft dressings may be introduced into the opening of the bone, and a due pressure be kept on them, by a compress and bandage.

END OF VOLUME FIRST.

C. STOWER, Printer, Paternoster Row.

Stevens Hospital Library

Library

S Library

STEVENS
HOSPITAL
LIBRARY